Australian Personal Computer

EXCLUSIVE! NSW 1985 COMPUTER SYLLABUS

ISSN 0725—4115 NZ $3.50
REGISTERED BY AUSTRALIA POST PUBLICATIONS VBP 3691

September 1984 $2.95

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The BBC Microcomputer is the mainstay of the British educational system and will take their youth confidently into the 21st century.

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Australia is fortunate to be able to adopt the entire project without change — and to enjoy all the future developments. For the BBC Computer Literacy Project is ongoing. It will still be with us in the 21st century.

Of course, you are probably aware that Barson Computers were selected to distribute the BBC micro in Australia and New Zealand because they have the desired technical expertise, and are capable of giving BBC Microcomputer users a very high level of support indeed.

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Postcode .....

- ☐ BBC Microcomputer
- ☐ Educational Software
- ☐ Games Software

1411/APC983

THE WORLD'S MOST EXCITING SCHOOL LIBRARY

When the BBC was assigned the task of producing a computer system for education, serious criteria were also established for the development of software which would form the basis of education today, and on into the 21st century.
As a result, more quality educational software has been developed for the BBC Micro that for any other educational computer. Not for the BBC the 'structured reinforcement' (drill and practise) variety of software. Here are examples of subjects, for students of all ages, covered by the world's most exciting educational and recreational software library.

Educational:

Art
Drawing. Painting.

Biology
Animal. Monohybrid/Dihybrid/Chromosome. Statistics for Biologists. Human Energy. Biology Pack. Pond Ecology. Transpiration. Counter Current. Blood Sugar. Predator-Prey Hereds/Multifactorial Inheritance. Countercurrent Systems. Biomass Production. Flowering Experiment. Physiological Simulation.

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Games and Educational Games
Fun With Words. Doctor Who. Fun Games. Philosopher's Quest. Monsters. Sphinx. Superlife. Adventure. Games of Strategy. Pirates. Snapper. Planetoid. Katakombs. Rocket Raid. Meteors. Super Invaders. Arcadians. Arcade Action. Games of Logic. Sliding Block Puzzle. Missing Signs. Cube Master. Chess. Time. Sailing Ships/navigation. Campaign 1346. Disraeli 1875. Castle of Riddles. Starship command. Missile Base. Snooker. Draughts. Reversi. Superlife. Battle. Cards. Hangman. Banner. Distances. Flags. Statpak. Countdown to Doom.

Graphics and Graphics Teaching
Shape Maker. Graphs and Charts. Creative Graphics. Eureka. Bar Charts. Moving Modules. Technical Drawing. Picture. Creative Graphics on the BBC Microcomputer.

General Educational Subjects
Educational I, Educational II. Results Analyst. Home Finance. Record Keeper. Desk Diary. Motorway. Farm Resources. Hill Railway. Rice Farming. Water on the Land. Prospecting. Light. Speed and Light. Urban Growth Stimulation. Urban Welfare. Census Analysis. Population Dynamics Transport/Manufacturing Location. Police.Diet. Map Skills 1 & 2. Balance Your Diet. Density and Circuit. Electrical Circuit.
Symbols to Moles. Lenses. Approximation, Estimation and Standard Form. Longitudinal Waves. Climate. Compass and Bearings. Yacht Race.

French
Respondez. Comprenez.

Logical Thinking
Venman. Vennkid. Shape. Gate. Watchperson. Spanish Main. Cat and Mouse. Logic Games. Concentration.

Language Arts
Early Learning. Word Hunt. Word Sequence. Sentence Sequence. Unscramble Spell. Pattern Recognition. Quiz. Anagram. Box/Wordshape. Dictionary Game. Vocabulary Practice. Hang the Man. Spelling Test Creation. List of Spelling Tests. Vocabulary Tester.

Mathematics
Fractions. Tables. Number Balance. Number Sequence. Maths Topics 1. Ultracalc. Algebraic. Manipulation. Trains/Arithmetic. Snap/Fractions. Ergo/Arithmetic. Morless/Number Concept. Abacus. Moving Modules. Multiplication. Speed Drills: Addition, Subtraction, Multiplication and Division. Read Speed Drills. Clear Speed Drills. Dice Addition and Subtraction. Long Multiplication. Area and Perimeter. Factor and Base Games. Equations, Pythagoras and Directed Number Games. Pythagoras Rule. Processes. Skill Counter.

Music
Music. Advanced Music.

Sciences
Evolution and Natural Selection. Particle Scattering. Genetic Mapping. Enzymc Kinetics. Homogenous Equilibrium. Gas Chromatology. Organic Synthesis. Decomposition. Sulphuric Acid. Synthesis of Ammonia. Element. Formulae. Gas Laws. Rates of Reaction. Reaction Kinetics. Compound Identification. Diet Analysis. Organic Analysis. Plant Competition, Photoelectric Effect. Mass Spectrometer. Planetary Motion. Gravitational Fields. Capacitor Discharge. Gaseous Diffusion. Radioactive Decay. Electric Impedence. Acoustics. Collisions. Momentum. Alpha/Range/Fraun/Decay. Chemical Analysis. Chemical Structures. Chemical Simulations. Atomic Structure/Equilibrium. Projectiles. Satellite Orbits. Orbits and Alpha Scattering. Exponential Growth and Decay. Alphafoil. Nuclei. Gravity. Quantum Shuffle. Random Walk. Ampere. Millikan. Malthus. Watts in Your Home. Moving Molecules. Photosynthesis. Metabolic Pathways. Wave Motion. Transverse Waves. Interference and Diffraction of Waves.

Spatial Perception
Shape Builders. Shape Shooter. What Shape. Axes of Symmetry. Crash. Perspective.

Word Processing
VIEW. Wordwise. Wordpack.

Note: The above describes existing cassette or disk software by title or content, and is a partial list only. Additional teaching aids including books, audio and video cassettes, tutors and OHP's, are all part of the BBC Computer Literacy Project. Software by Australian and International publishers and developers: Acornsoft, Advisory Unit, Cambridge Educational Software, Edward Arnold, Golem Software, Heineman, Input, Longman, Micro Primer, Passionfruit Software, Tas & WA Education Departments.

BBC MICROCOMPUTER / BARSON computers

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High jump into brave new era of 256k

By Chris Rowley

Have you noticed how things have accelerated as we jump into the 256k RAM era? Many different technologies, hard and soft, seem to be groping together towards a synthesis that may be as revolutionary as the cinema or recorded sound.

For instance, Optical Character Recognition (OCR) machines like the Workless Station from DEST Corporation that can read a sheet of type straight into a micro's memory and onto its screen in 15 seconds through an RS-232C port are now priced around $7,000. More advanced OCR devices, priced in the mainframe range of course, can chug through a Bible's worth of print in an hour. A much cruder $500 unit called Omni-Reader from Oberon International of Texas brings OCR tech-nology to bigger micros like the IBM PC XT.

VidLink from Digital Research consists of a cable and software package to link a Panasonic video disk player, Commodore 64 and television. In addition the noises emanating from the video disk world have the Trumpets of Glory about them lately. A micro on a disk, anyone?

And then there was US Patent 4460958, granted to three RCA workers for a micro system that will go into a top-of-the-line TV and store incoming signals, separate them into a number of components, and remove interference and noise. The system will also allow refinements like freeze frame and has the potential for interfacing to micros.

At the NCC in Las Vegas recently, Interstate Voice Products of Orange, California, introduced the $1,650 Vocalink speech recognition board for the IBM PC. The board uses an Intel 80186 chip and an ASA-16 Audio Spectrum Analyser chip which translates sound waves into digital code. This system still requires a $200 microphone and a pause of 120 milliseconds between each spoken word but a cheaper speech board is promised for the end of the year.

Down on the Sun Belt, where mechanical bulls used to send them flying in the urban honky-tonks, there is a new act in town right out of a Kurt Vonnegut novel. Warner Leisure Inc is installing fully-animated lounge singers, usually called Sammy Sands, which sit behind pot pianos and run through different 15-minute medleys of jokes and Country and Western songs throughout the evening. Sammy is moulded in larger-than-life glass-fibre with a silver lame jacket and he winks at the audience at the conclusion of each joke. This echoes the Audio-Animatronics show at Disneyland and is the first adult outgrowth of the Family Restaurant business like Warner's eight 'gadget restaurants' where robot Daffy Ducks and Bugs Bunnies entertain the kids over burgers and pizzas.

Charles Platt, science-fiction writer and author of The Whole Truth Home Computer Handbook, predicts that humans might wind up preferring to canoodle with robots programmed to cater for their special needs just as soon as the robots are mature enough to handle it.

Certainly we can expect interactive smut in the next few years. And we can assume that by 1988 the Republican Party Interactive Political Fireside Chat with the President will be on its way to market. There it is; why argue among yourselves when you can talk it out directly with the Pres on your own TV?

Fortunately, the Democratic Party will not adapt as easily to such devices. Despite the appearance of a multitude of computer monitors at the Democrats' convention in San Francisco the word is that many of the delegates never touched the things. The organisers, of course, wore their terminals down to the key connectors.

But the delegates' attitude to the white heat of technology was perhaps pointed up by the contrasting interest in two rival coach tours on the same day — one set of buses travelled south to Silicon Valley, the other north to Napa Valley. The score? Silicon Valley, one delegate; Napa Valley, 2,200 delegates. Conclusion: the Democrats had heard that those wealthy vine-growing winery owners in the Napa were all dyed-in-the-wool Republicans and they had to try to convert them...

however, is the RAM disk. It is provided by software, together with any 128 Kbyte memory block — up to four blocks can be plugged in to the parallel expansion port.

Not until you've used a RAM disk, will you realise how much time you spend in front of a computer, twiddling you fingers

It isn't just when you load a program — though goodness knows that makes a difference enough — but when it overlays — when portions of a long program, too big to fit into the normal memory space, are pulled in from disk and then are started up.

Most programs use this method of making sure that anybody, no matter how little memory, can run them, and most of them waste around three to ten seconds on each overlay. With the whole program in RAM disk, it takes microseconds.

With Lotus 1-2-3 on a plug-in cartridge, however, the possibility arises that people will actually prefer to use the Junior instead of the PC itself. Loading time will be instant, and with the RAM disk for spreadsheet storage, the program should run like a train.

The new 'proper' typewriter keyboard is likely to go a long way to putting smiles on the faces of US retailers. Many prospects have given the horrible, Sinclair-Spectrum rubber keys as their reason for choosing something else.

Naturally there will be those in Commodore and Apple who may observe that the offer is only possible because there are so few users of the Junior already.

The bad news is the price: it isn't prohibitive, but an extra 128k bytes of memory fetches US$325. That isn't cheap, when you consider that the 16 memory chips involved cost $5 or less, each. And to go beyond the first add-on memory block, to the full 512k memory expansion, the buyer has to spend extra ($150 extra) on a power supply expander.

And the price of Lotus 1-2-3 isn't reduced either — on ROM, it costs a full $495. But then, according to Mitch Kapor, boss of Lotus, it is a full feature 1-2-3, with no compromise on the code.

Guy Kewney

Too many disk formats, problem solved

When you order your sample disk from this months sample software offering, you'll have the Independent Software Duplication Service working into the wee hours to speedily deliver your disk formatted for your machine.

"Market research has shown that unlike other countries, Australia has a wide variety of computers and disk types available due to influences from Europe, Japan and America as well as the home grown products", says Vaughan Hillier and John Eager, partners in the Sydney Independent Software Duplication Service. They have introduced high-speed duplication of floppy disks and cassette tapes.

Based in a suburb of Sydney, the company has had five years experience in the duplication of compact cassette tapes for audio and computer usage and has now decided to move into the diskette duplicating area. Vaughan Hillier, the managing director of the company, believes that with the increase in sales of microcomputers, there is pressure on the software supplier to keep up with the demand. Vaughan has had 12 years experience in the computer industry and has teamed up with John Eager, the other Director of I.S.D., who provides technical and marketing support.

"Duplicating diskettes is a new venture for us", says Vaughn Hillier. He notes that the drop in software duty will have an impact on duplicating operations like his. "It means we are now competing against high volume imported US produced software which can be copied for 2 cents each disk on unattended machines. They just put them in the hopper and they drop out the end". Equipment that works like this costs upwards of $100,000. Hillier has invested a mere $25,000 on a ADC disk copier which will copy a Commodore disk in 30 seconds, and can copy or initialise most disk formats. Hillier's diskette copying charges range from 58 cents to 70 cents (single sided, single or double density), depending on volume, and includes the paper envelope. He will also print and supply labels. Cassette costs range from 89 cents to $1.16 and include wrappers. Hillier says that his ADC equipment is designed to produce error-free duplicates by performing surface test evaluation on the media prior to copying and data verification after copying. This ensures that all duplicate disks are 100% accurate copies of the original.

For further information call (02) 635 0704

Polaroid's instant hard copy for PCs

Polaroid has introduced to Australia a low-cost system for producing high quality instant 35mm slides and instant prints of personal computer graphics.

Called the Polaroid Palette computer image recorder, the new system is a software-driven peripheral designed for use with personal and small business computers, to make presentation-quality colour and black & white photographs on new Polaroid 35mm Autoprocess instant slides and Polacolour ER 3 ¼ x 4¼ inch instant print films.

The desk-top Palette connects to several leading models of personal computer, via a black and white video line and RS232C interface. The unit weighs 5.44 kilos and measures 40.6 x 20.3 x 15.2 cm.

Polaroid Palette is compatible with IBM PC, IBM PC/XT, Apple IIe, Apple II«, Compaq, Digital Rainbow and Franklin Ace 1200 micros.

In Australia, the Palette system will sell at $2200, excluding tax, for the

The Polaroid Palette System with 35mm camera back and Autoprocess equipment

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Free catalogue with price reference guides are available by contacting: Support Systems International, US 800 227 2598

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Be sure to check the chart on the subscription form to see if the software will run on your machine format. Now for more good news. When you subscribe to *APC* in this special September offer, you will also get another SECOND FREE GIFT. In fact subscribe now, and you'll get THREE EXCITING PARCELS IN THE MAIL; not only your sample software, but also, 100% FREE, you'll get a *royal blue and silver 12-month binder* to keep your precious copies of *APC* in order when you need to find a bench-test in a hurry. If you subscribe by September 28, you'll also get your October issue in the mail. So subscribe now, just fill in the form attached to the back of the magazine and send it to us. Make it a sort of early Christmas present to yourself. *Remember you get FREE sample software, a FREE 12-month binder, a year's subscription to APC, and what's more FREE postage as well.* This offer lasts for September only. Subscribe now by filling out the form attached to the outside of this magazine, or writing to the address above. You can address your envelope FREEPOST 6, 54 Park Street, Sydney 2000. That way, you won't need to stand in a queue for a stamp. Just drop it in the box. You'll get a year's subscription to *APC and* selected sample software *and* your blue and silver binder, all for the low September only price of $35. Do not despair if you don't have a disk system.

Next issue we'll be offering another special, and cassette samples plus 3" disk samples.

Please note that Microsoft software is free whether you subscribe or not. It will run on PC-DOS, MS-DOS, and in some cases, Apple II. Check the chart on the subscription form to make sure.

SOFTLIST

How to list your software in Softlist

A message to software publishers and authors

If you would like to have your new software listed in the *APC* Softlist, send details of your product to *APC* Softlist, C/- *Australian Personal Computer*, 54 Park Street, Sydney 2000. Please make sure you include requirements, and retail price, including tax. Please make some note about the supporting documentation, and let us know if it has a tutorial disk. If it is educational, please note the age level range it is intended for. If your material is cogent, detailed, and hype-free, it will probably go in the next issue. If you would like to have your product reviewed, please send a sample disk and manual. Reviews can take up to two months to organise. We will let you know if we plan to review.

If you would like to have your software available as part of the *APC* Softlist Sample Service, call the Editor, Laurel Allen on (02) 268 0666, to talk it over. This September offer is intended to test the waters for the sampling concept. By mid-September, we expect to have a good feeling for reader response to this world-first concept. If readers do want this service, then we will expand to offering software samples on cassette and on 3" and 8" formats, at the cost price of the media.

Our thanks to all those who took the leap off the edge with us into a new idea. In particular, Robert Eck of Memorex, Vaughan Hillier of Independent Software Duplicators, Peter Grimes of Control Data, Martin Lack of Arcom Pacific, and to Linda Graham of Microsoft, Phil Wooley and Gail Coulsen of Imagineering, and to Barson Computers, Futuretronics, Carpe Accounting and Osborne Computers.

General Software Samples Chart		Distributor	
Kaypro	Carpe Accounting	Carpe Software	$5
Osborne	Carpe Accounting	Carpe Software	$5
Apple II Series	Multiplan	Carpe Software	FREE
PC-DOS	Symphony	Imagineering and Sourceware	$5
	Thoughtware	Control Data	$5
	Multiplan	Microsoft	FREE
	Word	Microsoft	FREE
	Project	Microsoft	FREE
	Expert Systems	Microsoft	FREE
	Chart	Microsoft	FREE
	dBase III	Arcom Pacific	$5
	RBase	Imagineering	$5
	Supercalc III	Arcom Pacific	$5
MS-DOS	Thoughtware	Control Data	$5
	Multiplan	Microsoft	FREE
	dBase III	Arcom Pacific	$5
	SuperCalc III	Arcom Pacific	$5
CP/M	Chernich's Choice The best of CP/M Public Domain Software. A full program. Not a sample.	Arcom Pacific	$5
Morrow MD3 MDII	Carpe Accounting		$5

Educational Samples		Distributor	PRICE
Atari	Letterman Number Blast and My First Alphabet	Futuretronics	$5
BBC Acorn	BBC Sampler	Barson Computers	$5
Apple II series	Algebra	Control Data	$5
	K-7 Maths	Control Data	$5
	MEC Range General Sampler	Control Data	$5
	MEC Algebra Sampler	Control Data	$5
Apple IIc	PFS Write	Imagineering	$5
	PFS File	Imagineering	$5
Commodore 64	High School Algebra	Control Data	$5
	K-7 Maths	Control Data	$5
	MEC Range General Sampler	Control Data	$5
	MEC Algebra Sampler	Control Data	$5
MicroBee	Workabee		$5

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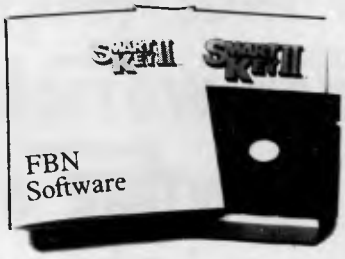

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The ten slowest parts of your computer.

SOFTLIST

GRAPHICS

Business Graphics for Osborne
OSGRAPH
Osborne
93 York St
Sydney NSW
02 290 3344

Osgraph produces Bar Charts, Pie Graphs and Line Plots on both the Osborne screen and a variety of printers from simple menu driven instructions. All chart parameters can be changed at any time and results instantly displayed. Charts can be saved, re-edited and printed at any time. The printer utility will accept some daisywheel printers including Qume and Diablo.

Osgraph's versatility comes from its ability to read data from dBase II, Supercalc, Mbasic programs and other input media.

Requirements: Osborne I, Osborne Executive 64k. Skill: Novice. Price: Approx $50.

Moving graphic 'slide shows'
OSBRIEF
Osborne
93 York St
Sydney
02 290 3344

Osbrief can create dynamic moving graphic displays for both the Osborne-1 and Executive computers to simulate a 'slide show' presentation. Osbrief enables the user to sequence and display any number of graphic screens by just listing the file names in their display order. It will read graphic data files from both Osgraph and Osboard. Special effects include wipes (left-to-right, right-to-left, top-to-bottom, bottom-to-top), fade-in and fade-out, curtains open and close, push and pull, spiral and many more.

Osbrief allows screen timing variations from 1 to 99 seconds or frozen. Screen painting in black, white or grey is also provided. Osbrief's power comes from its ability to convert ordinary text files from Wordstar, Supercalc etc. This gives unlimited scope for combining graphics with text and charts. It is very user friendly and menu driven.

Requirements: Osborne-1, Osborne Executive 64k. Skill: Novice. Price: Approx $40.

Graphics and languages
OSBOARD
Osborne
93 York St
Sydney, NSW
02 290 3344

Osboard is a full Graphics Editor for the Osborne-1 and Executive computers. Full cursor control enables an infinite variety of graphic screens and special displays. Osboard graphics may be printed on a number of popular dot-matrix and daisywheel printers. A special program Convert allows graphics files to be written into Mbasic, Cbasic and Assembly language programs. It is also compatible with Osgraph and Osbrief. All screens may be saved, printed and re-edited at any time.

Requirements: Osborne-1. Osborne Executive, 64k. Skill: Novice. Price: Approx $45.

Graftalk now for DEC
GRAFTALK
Fagan Microprocessor
95 Canterbury Rd
Middle Park, VIC
03 699 9899

Graftalk gives colour bar, line and symbol plots, composite plots, text, pie, exploded pie, and a mini spreadsheet and screen oriented editor. Tables of data must be typed in or graphed off a spreadsheet. Graftalk commands can be used in three ways; typed in for immediate execution, collected in the editor, or collected on disk to run as a full file of commands. Graftalk has built in help reference, and supports moveable legends and other annotation features. It also offers interactive sketch commands and other advanced features. All are accessible through English commands.

Requirements: 48k CP/M, 180k disk drives. Graphics device. DEC Rainbow, IBM PC, North Star Advantage, Televideo and CP/M-80 micros. Skill: Novice. Printers and plotters supported: Many. Price: $598.

Instant business intelligence
CHART
Microsoft
8/21 Tepko Rd
Terrey Hills
NSW 2084
02 450 2522

Microsoft Chart is a business graphics program that lets the user graphically explain ideas by choosing from over 40 different chart formats. The choice can be made by the user actually looking at a gallery of chart samples.

In addition to the 40 standard charts, the user can design their own with the freedom to change or edit individual chart components to create a new design.

Requirements: 128k, PC-DOS. Price: on request.

UTILITIES

Osborne now reads CP/M, MS-DOS
MEDIA MASTER
Osborne
93 York St
Sydney NSW
02 290 3344

Media Master allows all Osborne machines to access data, do disk to disk transfers, erase files, view and print directories and run most CP/M software. It will also read and write from CP/M to MS-DOS and PC-DOS and vice-versa. Osborne claims successful testing on IBM PC, Eagle PC, Hyperion, Olivetti PC, Televideo TPC-II, TRS-80, Morrow MD2, DEC VT180, Compac, Corona, TI Professional, Columbia, Sharp PC-5000, Kaypro, NEC PC-8001A, and Osborne SD & DD disks.

No hardware changes are needed. The software has a menu selection.

Requirements: Osborne-1, Osborne Executive 64k. Skill: Novice. Price: Approx $50.

Download from Charter to spreadsheet
LIBERATOR
Interactive Applications
63 Stead St
South Melbourne Vic
03 690 4983

Interactive Applications announced The Liberator, a program which allows data to be transferred from their famous Charter series packages, to a variety of productivity tools such as Lotus 1-2-3 and Multiplan.

The Charter series includes a range of accounting packages which can be used individually or integrated. They include Debtors, Order Processing, Invoicing, Inventory, Bill of Materials, Job Costing, Payroll, Creditors,

SOFTLIST

General Ledger, Fixed Assets and Time and Cost.

By using The Liberator, users can now convert The Charter Series data files to a format enabling access programs such as Lotus 1-2-3, Multiplan, dBase II, WordStar, Mars, Calcstar, Mailmerge and Datastar.

Requirements: Charter series. Skill: Novice. Price $250.

PC-DOS and CP/M together

CONCURRENT PC-DOS
Arcom Pacific
252 Abbotsford Rd
Mayne, Brisbane
QLD 4006
07 529522

The multi-tasking feature of Concurrent PC-DOS lets an IBM PC run up to four PC-DOS or CP/M applications programs simultaneously. In this way, a user can edit a report while receiving data from data base over a phone line.

A communications capability lets users work on one application while the system resources information from a data base like the source, or from a telex interface. The system's receiving data does not interrupt the user's ability to work on other tasks.

Concurrent PC-DOS's window capability lets users view, and thus monitor, the execution of four applications simultaneously. Windows can be positioned anywhere on the screen, scrolled or sized to display the most important parts of each application. Information can be cut and pasted from applications simply by placing the window over the appropriate data.

Several advanced productivity tools are included as part of Concurrent PC-DOS. With the Printer Spooler, users can queue documents to be printed while other tasks are printing. Because of the operating system's multi-tasking capabilities, printing and plotting can be done at the same time, or two printers can be run simultaneously.

Requirements: IBM PC or PC-compatible system with 256k of memory and two floppy-disk drives, although 512k and a hard disk are recommended for maximum efficiency. Skill: Novice. Price: $350.

COMMUNICATIONS

Do it yourself board software

COMPAC-XCOMPAC
Telehome Computers
PO Box 215 Northbridge
NSW 2063
02 958 2247

Compac-Xcompac lets DEC Rainbow users use their PC as an untended electronic mailbox. It also operates as a bulletin board with 24 hour access. A full message system lets clients collect and receive messages under password control. Users may transfer text or software in attended or unattended operation. The unattended mode needs an auto-answer modem. Transfer can be on protocol or non-protocol basis.

Requirements: DEC Rainbow, Auto-answer modem for unattended operation mode, UDM-1200 recommended. Skill: Novice. Price: Compac (two way transfer) $150; Xcompac (automatic messaging) $250.

Communications for the Macintosh

MACTERMINAL
Apple Computers
37 Waterloo Rd
North Ryde, NSW 2113
02 888 5888

Apple Computers has introduced MacTerminal, a data communications software package that allows the Macintosh personal computer to interact with mainframe and minicomputers as well as commercial electronic information services.

MacTerminal features a file transfer capability which facilitates the transfer of text and graphics to Macintosh or Lisa computers in different locations.

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- SIMPLE SPREAD-SHEET
- SIMPLE WORD-PROCESSING
- MAILING LISTS
- STANDARD LETTERS
- LABELS

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META4 is suitable for a very wide variety of business, professional, academic and personal applications, such as

BUSINESS
CUSTOMERS, QUOTES, ORDERS, SALES, INVOICES, ACCOUNTS, CREDITORS, NAMES, LETTERS, ADDRESSES, FINANCIAL, LABELS, SUPPLIERS, PRODUCTS, CATALOGUES, PERSONNEL, ORG STRUCTURE, DEPTS

PROFESSIONAL
MEDICAL, DENTAL, LEGAL, PHARMACEUTICAL, INSURANCE, FARMING

ACADEMIC
LIBRARY, STUDENTS, TIMETABLES, SCORES, BOOKS, BORROWERS, PAPERS, AUTHORS, REFERENCES, LECTURES, FORMULAE

INDUSTRY
VEHICLES, REPAIRS, MAINTENANCE, PRODUCTION

REAL ESTATE
PROPERTIES, ENQUIRIES, ADVERTISING, CLIENTS, RENT, COMMISSIONS

PROJECT
TASK LISTS, SCHEDULES, DIARY, MEETINGS, MANUALS, DOCUMENTN, TIMESHEETS, ESTIMATING, BUDGETS

Information from any or all of the above applications can be AUTOMATICALLY LINKED & CROSS-REFERENCED, since META4 is a true Data Base system.

BASIC CONCEPTS

META4 uses familiar concepts to aid you in it's use.

ROOMS — META4 has many rooms in it. Each room is used to store information about a different type of thing.

QUESTIONS & ANSWERS — when you go into a ROOM META4 asks you QUESTIONS about the type of thing (e.g. CUSTOMER INVOICE, PRODUCT etc) held in the ROOM and stores away your ANSWERS.

RECORDS — META4 stores the ANSWERS to a set of QUESTIONS in a room as a RECORD. There can be many RECORDS in a room.

DOORWAYS — You can move from ROOM to ROOM through DOORWAYS. META4 automatically relates information in one ROOM to information in the rest.

BUILDINGS — A building is a collection of related ROOMS and DOORWAYS. A BUILDING corresponds to the traditional concept of a Data Base.

META4 IS PORTABLE

Any application you develop under META4 will tun without change on any computer that META4 runs on.

EASE OF USE

- SIMPLE AND CONSISTENT
- HELP — 3 levels for the current
  - —BUILDING you are in
  - —ROOM you are in
  - —QUESTION being asked
- 3 TUTORIALS
  - —USING META4
  - —DESIGNING WITH META4
  - —META4 EXAMPLES

Designed from the ground up to be totally consistent and as easy to install, learn and use as possible.

META 4 IS EXTENDABLE

All the features of the system are fully extendable to your own applications. You can add your own BUILDINGS, ROOMS, DOORWAYS, and QUESTIONS. You can define your own maps, HELP text and tutorials.

SELLING YOUR META4 APPLICATIONS

If you wish to sell your application you will have the widest possible market. We will evaluate your application and may assist in marketing it.

DETAILED FACILITIES

- Menu drives
- True DATA BASE — RELATIONAL/NETWORK
- Variety of Answer-types e.g. CALCULATED, DATE, YES/NO, NUMERIC, TEXT, LIST
- FULL PROMPTING
- Automatic VALIDATION
- Powerful Selection & Reporting
- All facilities fully EXTENDABLE to user's own applications
- No programming
- Full DATA DICTIONARY defined as a META4 application
- Automatic TOTALLING of lists
- Automatic COPYING of ANSWERS from one room to another
- Automatic MAINTENANCE of records in other rooms (Secondary Index facility)
- Copying of information to and from other products such as WORDSTAR
- B-Tree ISAM Source Code

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APPLE-II — 64K RAM, 80-Column Card. CP/M card. 2 diskette drives

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META4 (CP/M)	$395.00
META4 (IBM-PC)	$395.00
META4 (MS-DOS)	$395.00
Non-Standard Disk Conversion	$50.00
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QLD: MERMAID COMPUTERS (075) 35 5511
WA: COMPUTER AGE (09) 384 1111 SA: COMPUTER MARKETING HQ (08) 260 2444. GENERAL BUSINESS MACHINES (08) 42 0031

SOFTLIST

In its terminal emulation mode, MacTerminal eliminates the multiple keystrokes normally needed to call up functions specific to mainframe applications. Instead, it provides a graphic pull-down menu that displays special function keys. The user simply opens the menu and uses the mouse to point to and select the right key. The pull-down menu displays appropriate keys for both VT100 and IBM 3278 terminal emulation. With modem, it provides asych comc via VT100, VT52 and TTY Terminal emulation. Bell standard is provided, but CCITT is not yet available.

Requirements: Macintosh, Apple-compatible modem. For IBM 3278 either Appleline, coax unit or Apple Cluster Controller. Skill: Novice. Price: Approx $150.

Telex from your terminal

HPTelex
Hewlett Packard Australia Ltd
31–41 Joseph St
Blackburn VIC 3130
03 895 2895

HPTelex provides a Telecom approved system for HP3000 computers. A telex can be prepared, edited on screen and sent automatically.

Ingoing and outgoing telexes can be copied by a printer connected to the HP3000. Messages can be sent in order of priority, or be deferred to catch off-peak period and save costs. A security feature using passwords prevents unauthorised people from sending messages.

Requirements: HP 3000, A Telex Interface Unit (sold by Case Communications Ltd). Skill: Novice. Price: $4620.

WORD PROCESSING

For work or home

EASY SCRIPT
Commodore Business Machines
Private Bag No 21
Lane Cove West NSW 2066
02 438 2955

Easy Script is a word processing program for home or business use, with many features found usually only in business or professional systems.

Features include the ability to interface with the Easy Spell 64 program, a spelling check package. As well, Easy Script transfers words, phrases and blocks from one section of text to another.

On disk, Easy Script also has the functions of full horizontal and vertical tabbing, variable margins, search and replace, mail merging, and file linking. It can be used for writing letters, reports, memos, book manu-scripts and all documents.

Requirements: Commodore 64 Disk System. Price: $100.

APPLEWRITER II FOR //e AND //c
Apple Computers
37 Waterloo Road
North Ryde, NSW 2113
02 888 5888

The new AppleWriter II for the //e and //c is a revised version of AppleWriter //e. The product is based on the ProDOS operating system and features enhancements such as horizontal scrolling, built-in terminal mode that enables users to access information services, and the

SOFTLIST

ability to see page and line count within a document before printing.

Requirements: //c, //e, 128k. Skill: Novice. Price: $300.

MULTIMATE
SCA Software
449 Swanston St
Melbourne Vic 3000
03 347 7011

MultiMate Exchange will help users of MultiMate professional word processing software exchange files between their personal computers and dedicated word processing equipment.

MultiMate was designed to enable IBM Personal Computers (and compatibles) to emulate the Wang dedicated word processor. The new MultiMate Exchange program will convert Wang's WPS format files to MultiMate document format and vice versa and will do the same with the IBM Displaywriter, DEC Mate II and others.

The conversion software will run on the IBM Personal Computer (and compatibles). Transfer of files between machines will require a device called the FormScan Codem Intelligent Interface, made by FormScan Inc. of Melville, New York and also to be available through Software Corporation of Australia.

File conversion can save the time and expense of entering documents into a new system manually. Users can share files among dedicated word processors and PCs, or even replace the more expensive word processors with MultiMate equipped PCs without retyping documents that were created on the old system.

Requirements: IBM PC and strict compatibles. Price: $595.00

WP for the masses

PFS WRITE
Imagineering
3/579 Harris St
Ultimo NSW 2007
02 212 1411

PFS Write is a word processing software package with competitive features such as bold face, underlining, centering, justification, page headings and footings and automatic page numbering. It will interface with other PFS program.

Requirements: Apple DOS, PC-DOS, TRS-80. Price: $175.

Slick as owl-spit

WORD
Microsoft
PO Box 98
Terrey Hills NSW 2084
02 450 2522

Microsoft Word is a mouse-driven easy to use, see what you get word processing program. Version 1.1 has a database and merge facility. Form letter sheets are a special feature.

Requirements: PC-DOS and strict compatibles 128k. Graphics board. Price: On request.

FINANCIAL

Save time on calculations

CALC RESULT AND ADVANCED VERSION
CommodoreBusiness Machines
Private Bag 21
Lane Cove West
NSW 2066
02 438 2955

Available in two versions, Calc Result is an electronic spreadsheet for the Commodore 64 as well as for the company's 700 and 800 hardware.

Both programs, Advanced and Easy Calc Result are available on disk and cartridge with their main advantage being incredible time saving in complicated calculations.

The Advanced program, through a sophisticated function of 64 columns, 254 rows and 32 pages has editing functions and help screens as well as bar charts and individually formatted tables.

Four pages at once can be viewed on the screen and five tutorials are included in the manual as introductory training.

Calc Result Easy program is a simplified version of the Advanced version, with 64 columns and 254 rows, and full editing facilities and complete graphic representation for both screen and printer outputs.

Requirements: Commodore 64 disk system. Printers: 801, 803, 1526. Price: $100, Advanced version $200.

Financial wizardry for all

MULTIPLAN EXPERT SYSTEMS
Microsoft
8/21 Tepko Rd
Terrey Hills
NSW 2084
02 450 2522

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BIOLOGY, cells, transport, genetics, photosynthesis, respiration. **CHEMISTRY**, moles and formulas, redox, acids and bases, bonding. **PHYSICS**, free fall, circular motion, sound, momentum, waves. **SCIENCE**, light, matter, radioactivity, electricity, magnetism. **SPELLING**, for chem., biol. and physics, 2 disks for each subject.

ENGLISH

Spelling (6 levels and 10 programmes per level), homonyms, antonyms, suffixes, prefixes, plurals, ie or ei, sentence structure, and beginnings, excess words, quotations, word endings, punctuation, capitalization.

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We have a lot of them.

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the Computer Spot

MLC CENTRE: Martin Place, Sydney. Phone: (02) 235 2971.
EASTGATE CENTRE: Bondi Junction. Phone: (02) 387 5208.

THE MAT CS2086

templates to Multiplan which make the spreadsheet easier to use, and save considerable time in setting up complex financial worksheets. They work on a menu system. After you have answered all the questions, the Expert systems present you with a spreadsheet ready to go.

Requirements: PC-DOS, MS-DOS or Apple DOS, 128k and Multiplan.

An old favourite

MULTIPLAN 1.07
Microsoft
8/21 Tepko Rd
Terrey Hills
NSW 2084
02 450 2522

The now famous classic spreadsheet, Multiplan suits budgeting, forecasting and other financial analysis tasks in home or office environment. Commands are always visible on screen. Online help is built-in and work sheets may be linked, and columns of data sorted.

Requirements: Apple DOS, PC-DOS or CP/80.

Small business accounting on 56k

CARPE ACCOUNTING
Carpe Office Systems
Dee Why NSW 2099
02 981 2022

The 'Carpe' General Accounting and Management Information System is an integrated accounting system specially designed for the small to medium size business. The accounting principles and concepts existing in Carpe provide all the facilities for management to properly control the company.

Carpe ensures that all 'on request' enquiries and reports provide accurate and correct accounting and management information for all ledgers. This is done by extensive use of automatic 'single entry' accounting techniques which ensure that all subsidiary ledgers are updated at the time the entries are made wherever practical. For example, a single invoice produced can immediately update the debtors ledger, the stock ledger, the sales tax analysis, sales analysis by debtor, by product, by area, by salesman and have the necessary totals to automatically transfer to the General Ledger.

Units consist of General Ledger, Debtors, Invoicing/Stock, and Creditors.

The system is menu driven, and has password control. It will handle five hundred accounts in the Chart of Accounts.

Requirements: Minimum 56k. Dual disk drives. Price: On request.

NEW IDEAS

Improve your people skills

THOUGHTWARE
Pitman Publishing
158 Bouverie St
Carlton Vic
03 347 4055

Thoughtware allows people to evaluate and improve their management performance. Thoughtware identifies characteristics that exhibit superior managerial performance – and develop diagnostic and training programs that allow you to put these findings to use.

Thoughtware saves costs on management training. The Thoughtware series lets you assess personal management skills, evaluate organisational effectiveness and understand personal interaction styles.

The management training series helps users to lead effectively, motivate to achieve results, define goals and objectives, improving employee performance, appraise performance, manage time effectively, conduct successful meetings and manage by exception.

Requirements: IBM PC and PC compatibles with 128k, MS-DOS and colour graphics card.

DATABASE

Make your own menus

SUPERBASE
Commodore Business Machines
Private Bag 21
Lane Cove West
NSW 2060
02 438 2955

Superbase is currently the most powerful database management system available for the Commodore 64, according to Commodore Computers.

The program is easy to use, controlled by menus from which the user selects the desired options.

As well, however, Superbase is a powerful application generator and database programming language. This allows the user to automate the operations most frequently required and even to set up personally tailored user defined menus to individual needs.

Requirements: Commodore 64 disk system. Printers: 801, 803, 1526. Price: $180.

Database gets easier

dBASE III
Arcom Pacific
PO Box 13
Clayfield Qld 4011
07 52 3862

dBase III is the new easier-to-use 16 bit version of dBase II, the popular 8 bit database management program. dBase III has English-like commands and full HELP, and fast sort powers over an unlimited records figure. It can be programmed for automatic functions on different days. A tutorial disk is provided.

Requirements: PC-DOS 2.0 or 100% compatibles. Price: $795.

Practical filing program

PFS FILE
Imagineering
3/579 Harris St
Ultimo, NSW 2007
02 212 1411

With PFS File, your information is organised in forms you design yourself. You can search for your information and print selected items for example a mailing list sorted by area code.

Requirements: PC-DOS. Price: $175.

INTEGRATED SOFTWARE

Mac-style commands for Commodore

MAGIC DESK TYPE AND FILE
Commodore Business Machines
Private Bag 21
Lane Cove West
NSW 2060
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Magic Desk replaces software written commands with pictures and sounds, in a package that combines word processing, an index file telephone listings, calculator and financial journal. Commodore will soon offer in the

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APC

SOFTLIST

same format education programs, music programs and others.

On screen, the user sees a full colour animated office: desk, filing cabinet, clock, typewriter and wastepaper basket. A hand with a pointing finger is controlled by the joystick. When the finger is pointed at the typewriter for example, and the "fire" button pressed, you get an enlarged graphic representation of a typewriter, paper in place, and margins set. You type away, and Magic Desk not only gives typing sounds, but a ding at the end of every line.

Requirements: Commodore 64 cartridge system. Skill: Novice. Price: $60.

Apple integrates Lisa software

LISA 7/7
Apple Company Aust Pty Ltd
37 Waterloo Road
North Ryde NSW 2113

Lisa 7/7 combines all seven Lisa Office System functions into one integrated package; project management and word processing, spread sheet, data communications, database, business graphics and structured graphics. Each function has been improved. It has a new operating system integrating the functions and provides a security system to control access to documents, as well as print queuing for automatic printing while you work. Lisa 7/7 stores Macintosh data.

Requirements: Lisa 2/2, Lisa 2/10, Lisa 7/7, a hard disk, 1Mb of internal memory or optional memory upgrade board to Lisa 2/5 or 2/10. Skill: Novice. Price: $900 or $350 to upgrade Lisa 2/5 or 2/10.

Rival for Symphony and Framework

CORPORATE MBA
Intelligence
204 Clarence St
NSW 2000
02 267 1711

Corporate MBA combines all six major functions needed to make the most effective use of a personal computer — electronic spreadsheet, word processing, information management, telecommunications, business graphics, forms creation and macro development.

With Corporate MBA, the screen is divided into a number of rows and columns, forming a grid of 95,000 cells. These cells can hold many things including numbers, formulae, pages of text and downloaded telecommunications data. Up to 16,000 records can be stored on a hard disk.

Data can be displayed in one window and the graph version in an adjoining window. The workspace, as it appears on the screen, can be printed with the graph cells plotted and printed separately if required.

The IBM personal computer can be turned into a 3278 terminal using the IRMA board and communications capability. These communications commands allow the user to set a telecommunications link with a remote computer, database or time-sharing system, using a standard modem. Data can be retrieved, using codes and protocols already written and stored in MBA cells.

Requirements: IBM and compatibles. Price: $1,200.

Integrated graphics

SUPERCALC 3
Arcom Pacific
PO Box 13
Clayfield Qld 4011
07 52 3862

This is an integrated spreadsheet, with database and particularly strong colour presentation graphics.

It includes a tutorial, and requires only 96k under MS-DOS 2.0.

Requirements: 96k, MS-DOS 2.0 for best performance and colour graphics, a colour board and a plotter. Price: On request.

High-powered product

SYMPHONY
Imagineering
579 Harris St
Ultimo NSW 2007
02 212 1411

Symphony is an integrated package which includes five applications: spreadsheet, word processing, database, graphics and communications. These applications are joined together in a number of ways through a windowing system, common command structures and a command language, making it possible to move data between applications or to include references to data in other applications.

Requirements: PC-DOS, minimum 320k colour graphics card. Price: $995 or $300 to trade up from Lotus 1-2-3.

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Requirements: Sanyo 555 or any CP/M based machine. Skill: Novice. Price: $8.95.

PROJECT PLANNERS

New Microsoft Project Planner

MICROSOFT PROJECT
Microsoft
PO Box 98
Terrey Hills NSW 2064
02 450 2522

Microsoft Project makes it possible for managers to use their personal computers to create schedules, allocate resources and budget costs for their projects whether they are relatively simple or complex tasks.

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Project has a resource profile chart. A graphic display of this chart will appear on the screen when and by which activities, each resource is being used. This means that resource levelling requirements can be determined in an instant.

Project also gives the user instant 'what-if' capabilities. The impact of scheduling changes can be assessed immediately so that the best schedule is easy to determine.

Requirements: IBM PC or strict compatibles.128k, at least one double sided disk drive. Skill: Novice. Price: $395.

The tiny portable computer you see below can do everything the average desktop can do. And more.

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Normally you'd expect to find those specifications on a desktop computer.

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There are 60K and 120K battery-operated RAM packs which can be permanently added to the PX-8, greatly enhancing its memory capacity, without sacrificing its portability.

There is also the EPSON P40 compact thermal printer which operates on NiCad batteries, as well as a complete range of dot matrix printers.

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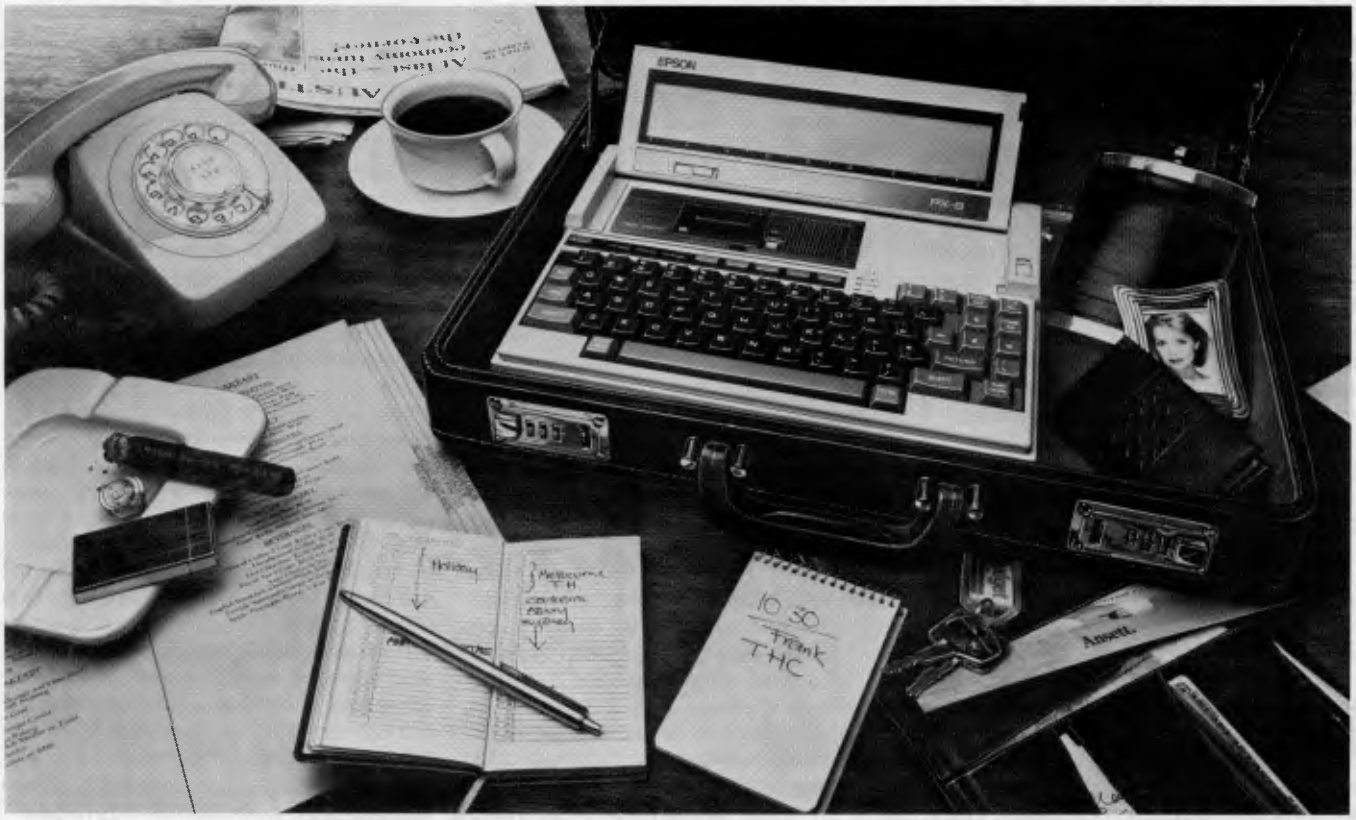

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PROFILE

Wayne Wilson

The Australian who invented concurrency

New software projects now on the drawing board

Wayne Wilson, of Blacktown is a little-known Australian hi-tech hero. He invented the concurrency concept that Australians now buy back from Microsoft and Digital Research. "We also had multi-user before Digital Research, and were the first to offer CP/M windowing" claims Wilson, and his partner, Roger Jones, who were also first to offer 8 and 16 bit running together. You'd think the world would beat a path to the door of AED (Acoustic Electronic Developments) unfashionably-located Blacktown Sydney factory door.

But software developments are not panentable. Once an idea is out, it's open slather in the rush to commercial production. AED missed out because they didn't have the marketing power. At the time of the development of the concurrency concept, Wayne Wilson had talked over the concept with Morrow of California.

Incestuous relationships in Sunnyvale, California moved the AED concurrency idea swiftly through the system; "We believe Digital Research was very much influenced by our work, because Morrow are very close to Digital Research" says Wilson.

"If we had had the money, the world would have had concurrency two years earlier" says Wilson sadly. "Now", he says, "when we have a new idea, we want to make a dollar out of it".

But Wilson and Jones have no hard feelings. "If Edison hadn't existed, someone would have invented the gramophone eventually". Of the two, the animated Wilson is the inventor, and the fast talker. Partner, Roger Jones is also an engineer, but applies his particular genius to the details of finance, and the "can it be done, will it sell, and for how much" questions.

The concurrency development research cost Jones and Wilson $180,000. "It probably paid us back $60 000. But now it's a world standard. We didn't make any money on it, but it has raised AED's esteem."

Jones and Wilson hold that the law of creative design is "the amount of creativity in any given design is directly proportional to the number of engineers grovelling around the floor with a rats nest of paper and an oscilloscope".

"Out at Blacktown, there's a fair amount of grovelling among the test results right now as AED works on new things. They won't say what new things, because they have learned a hard lesson. This time, they plan to bring their ideas to fully marketable reality before they break it to the world. They are applying their ingenuity and creativity to a mysterious operating system project undoubtedly related to their planned June 1985 release of their UNIX system on the Intel 8286, and their high-speed file I/O. This latter device, will, they claim dramatically improve the disk to I/O transfer by a multiple of 4.

Jones sees the possibility that the AED file I/O will have an impact on the US market. But the situation remains volatile, "Things depend on the US mood at the time, and our agreements with Macrotech and Gifford" says Jones.

Their R & D work promises products that anyone anywhere might be interested. So much that Jones and Wilson are a little worried about industrial espionage. They are about to regularly check their R & D rural hideouts for bugs, and check visitors for microphones. "Your heart goes out to IBM", says Wilson, in an unusual flash of inter-corporate sympathy. "Those guys must have a terrible hassle, trying to keep secrets from AT & T".

Wilson started off as a technician with STC working in communications and industrial control, and worked in London, and Indonesia and the US. At 20, he decided to try a few ideas on his own. He developed an acoustic measuring instrument for ATN.7 which measured reverberation constants in a sound room.

He didn't sell too many of these. Then he came up with his first hot product; a tourist coach sound system, simple to repair and portable between coaches. Wilson sold 15. Then he moved onto machine control, starting with a plastics extrusion control system for Scobel Australia. He began to manufacture, using imported parts from the US.

Engineer, Roger Jones joined AED in 1979. "Roger could see that I was a bit of a dreamer — an ideas person — always looking for ways to make a better mousetrap", says Wilson.

"True", replies Roger Jones. "He comes up with the ideas, and I say whether it can be done". Sometimes Jones decides that it can't be done, and the world doesn't need Wilson's better mousetraps. When this happens, sometimes Wayne Wilson disagrees "When someone says it can't be done — I get mad. I try to show that it can. But if Roger can see that I have a total commitment, then he says 'Go ahead'. Sometimes this works, and sometimes it doesn't.

"For example with MPS (Multi-program Selection), if I'd taken the first knock-back, we wouldn't have it now."

Looking at the microcomputer market he notes that in the 70's and early 80's machines were all made by small producers. But now, he says, you have to get big, market successfully, and have a brilliant machine as well.

Jones and Wilson like to think they are a small company with a brilliant machine, which is working very hard on cranking up their marketing. Their Universe "supercomputer" is described as the computer that computer people buy. AED extends their competitive technical edge to their one year warranty, service, and system design. "We tried to make it as reliable as possible, and as modular as possible".

PROFILE

All the functions of the AED Universe are on separate cards. The power units and the drives are also replaceable. Access to the system is by keylock, and cards can be changed in minutes. AED quotes an onsite 30 minute repair time. The meantine between failures is two to two and a half years.

AED claim to offer a competitive price on their systems because they manufacture memory cards in Australia.

AED now sells two Supercomputers a week, and expects that figure to rise to four per week by Christmas. The average purchaser spends $20,000. "Today purchasers want more and more. They want mini systems at a micro price", says Wilson, of AED's design considerations.

"The marked demand is for reliability, service support and speed — and now they want multi-user capacity as well, and they want to keep that speed, even within the multi-user field", notes Jones.

"People also want something that is easy to use. Corporations want fully integrated computing databases, and high speed at a low cost". Jones illustrates the insatiability of the demands; "As soon as we offered six terminals, people wanted 10, then they wanted 32".

Jones and Wilson says that by the end of 1985, they will deliver what the market wants; a mini-system at a micro price.

AED current offerings (which are regularly upgraded) include single and multi-user systems (up to 32 users) based on the Intel family of processors (8085, 8088, 8086, and 80286).

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KX 1212 KX 1213	**Green** (P39) or **Amber** (PUL) Monochrome: Video Bandwidth – 20 MHz Horizontal Res. – 800 Dots Horizontal Freq. – 18.432 KHz	**IBM** & **IBM** compatibles only	Green – $310 Including Sales Tax Amber – $340 Including Sales Tax
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Vision II	Input Form – RGB Separation Video Bandwidth – 15 MHz Min. Slit Pitch – 0.47 mm Horizontal Res. – 510 Dots Vertical Res. – 262 Lines	**IBM, Apple, BBC,** all **IBM** compatibles and microcomputers with RGB output	$645 Including Sales Tax
Vision III	Input Form – RGB Separation Video Bandwidth – 18 MHz Min. Slit Pitch – 0.38 mm Horizontal Res. – 630 Dots Vertical Res. – 262 Lines	**IBM, Apple, BBC,** all **IBM** compatibles and microcomputers with RGB output	$895 Including Sales Tax
Vision IV	Input Form – RGB Separation Video Bandwidth – 25 MHz Min. Slit Pitch – 0.31 mm Horizontal Res. – 790 Dots Vertical Res. – 400 Lines	**IBM** (using double high resolution graphics board) and any microcomputer that produces in excess of 750 dots horizontal res.	$1,135 Including Sales Tax

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These systems run Digital Research's operating systems including CP/M, CP/M plus, CP/M-86, Concurrent CP/M-86 and MP/M-86. 8 bit compatibility has been added to concurrent CP/M-86 and MP/M-86. This is endorsed by Digital Research. The systems are called Concurrent CP/M 8-16 PLUS, and Concurrent MP/M 8-16 PLUS. Hard disk are offered ranging from 16 to 600 megabytes. Single user systems are available based on the Zilog Z80 processor.

All systems are based on the 696/100 bus and provide an 8" disk drive, with standard commercial software as available for CP/M 2.2 and CP/M-86, from such suppliers as Digital Research, Ashton Tate and Sorcim.

Powerful CAD graphics are offered at a claimed 50% price benefit reduction on comparable systems. AED's Concurrent MP/M 8-16 offers telecommunications, modem support, electronic mail, time-stamping encrypted passwords, Telex and numerous features extra to the Compupro MP/M version.

Average value of system purchase is $20 000. Customers may buy terminals and printers separately, or as supplied by AED to their particular needs.

AED are looking at doing their own terminals. When they do this, they will offer high resolution as a standard, and will offer 10 pages of concurrency; four concurrent, and six 'MPS-ible'. Wilson explains: "In MPS you can jump around a number of frozen tasks. It needs disk drive storage, but no memory. This gives you 10 pages, but you can't run them together at the same time".

"Concurrency lets you move from task to task. You can have them all running at the same time, and you need memory for each task".

AED want to stay with the new ideas. They cite their connections with the US computer companies Digital Research, Morrow, Compupro, and Gifford as one way they keep up with the play.

Gifford, for example, are working on an operating system for Compupro based on Digital Research's OS. Jones notes that AED is one of three companies in the world beside Gifford that has the source code for Digital Research's multi-user operating system.

"We have an agreement with Gifford, so that the wheels don't get re-invented. We have swap meets, telephone calls and disk exchange" says Jones.

"Looking at the industry, AED predict that DEC, AT & T and IBM will all release multi-user systems before Christmas. UNIX, they say will become the world's multi-user operating system standard.

The 8286 will take over, because already DEC, IBM and AT & T have made the choice, they predict. The 286 is the processor for the near future, they say. There will be a death in the MS-DOS software available. You'll buy UNIX instead and the MS-DOS shell and the CP/M shell and the CP/M-86 shell. Microsoft and Digital Research are already writing to this end, says Jones.

"The whole industry is turning around. We started with CP/M, everything ran on CP/M. Then IBM confused the issue by using MS-DOS. But standardisation is coming back in via UNIX and the shells which emulate the other operating systems, he says.

You can smell the loyalty to Digital Research out at AED. They like the high-toned "by-engineers-for engineers" mood of the California CP/M company. They don't go for MS-DOS at all, although users can have it on the Universe. "What's wrong with MS-DOS?"

According to Jones: "With MS-DOS you can't call console status. This means if you have a program on the screen running through a listing — you can't have a freeze or an interrupt. To do it, you'd have to press the space bar continuously", he complains "WordStar, for example, has to poll the system all the time — it has to make a direct call to the hardware."

"People say 'I want to have MS-DOS'. Why? 'Because I want to be IBM-compatible'. But MS-DOS is so poor it needs hardware hooks", says Jones. "What's going to happen is that soon we'll all be using UNIX with MS-DOS and CP/M 86 shells IBM has endorsed a UNIX for the IBM PC, and Xenix V.4 will be delivered by Christmas. Digital Research already have a UNIX shell for Concurrent DOS".

Jones expands on his theme: "MS-DOS is a quick and nasty operating system. It makes too many outside calls to hardware. Many of the programs you buy for MS-DOS have to have an IBM PC to run. "But this doesn't happen on CP/M-86. There are lots of calls the software writer can get at", says Jones.

"In two years time, you won't hear the word MS-DOS", he predicts "You'll hear UNIX. Memories will be cheap. You'll have operating systems under operating systems".

Jones and Wilson anticipate that soon mini-computers will disappear, "Minis will be absorbed by the more powerful, lower priced micros", they say. He predicts an animal which will be a sub-mini-super-micro with extremely high speed for both CPU and disk, and obsolescence immunity.

In design terms, this matches AEDs own aspirations. In four years no Universe customer has traded in or dumped any system — they just up grade, report AED.

Wilson and Jones find financing growth a problem. There are risks involved, they say, and not every financier knows enough about the technologies to feel the confidence to finance.

Jones sees two paths for AED in their growth. The first option — go up at an incredible rush. New models, new ideas, and a raft of capital. The second choice he sees as the sideways action; "Just make the machine you made last month, and don't do any overheads in R & D".

In the future, Wilson suspects that the quantity of innovation from AED may diminish. In the early days, he says, "we were firing ahead of the pack. Then we wouldn't offer anything less than the best". Today, Jones notes, the differences are smaller. Its harder now to retain a margin." You have to work 80% harder to be 10% better".

Resting from working 80% harder, there are other things to life beside computers, for Jones and Wilson. Jones likes trains. "You have to have a hobby, or you go around the twist", he says. Jones makes 5" gauge 1/10 scale trains that haul 1.5 tons. His next model will be computer controlled.

Wayne Wilson turns to music, and the piano. He has a Kawai half-grown grand at home. His choice of music matches the business situation; when he's got cash-flow problems, he'll go home and brood over the keyboard with "The Eroica, the Funeral March", he jokes. When thing are looking up it's "Handel".

For details or an information kit contact:

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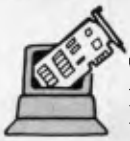

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GOTO... thou sluggard

Structured programming makes for clear listings, but that's no help when you're debugging on a 20-row screen. David Bradnack believes judicious use of GOTOs is the answer.

10 It seems to be widely believed that good programming uses subroutines and does not use 'GOTO'. Gosub 20. I hope I have made my point.

```
15      100 GOSUB 3000
        200 GOSUB 1000
        300 GOSUB 2000
        400 PRINT "TOTAL =";T
        500 END
        1000 REM SELECT RECORDS
        1005 REM FOR CALCULATION
        .....
        1999 RETURN
        2000 REM DO CALCULATION
        ....
        2999 RETURN
        3000 REM OPEN FILES
        3005 REM & INITIALISE VALUES
        ....
        3999 RETURN
```

Return

20 My first serious attempt at understanding and adapting a professionally produced program has left me unconvinced of this — though I may have been unlucky in my program! Gosub 50. Gosub 30. Gosub 40. Obviously this structure does not suit my subject matter, but return.

30 Gosub 150. The emphasis needs to be put more on the length of program sections. There seem to me to be critical lengths at about 20 lines (a screenful) and at either 65 lines (a page) or possibly 130 lines (a double page). Gosub 110. Gosub 100. Gosub 120. In other words, program structure must take into account the physical constraints of how much of a program one can examine closely 'at a glance' as one unit (a screenful?), and how much one can get a reasonable overview of (one or two pages?).

On a printout, it is possible to clarify a program structure considerably by arrows, coloured marks, and so on, but this is much less effective if one cannot see the whole scheme at once, without turning pages backwards and forwards. Return.

40 In our culture, in trying to understand a text, one normally starts at the beginning (the top) and goes on to the end (the bottom). Gosub 150, this should be taken into account in program structure, so that within the obvious constraints imposed by the fact that programs branch and double back, the logic of a program should flow from the beginning of the listing to the end. Gosub 190. Return.

50 Though it is true that the use of subroutines encourages the programmer to plan his program in clearly defined blocks, this does not help understanding of the program if the blocks are left in haphazard order, as is sometimes the case with subroutines. Gosub 150. Gosub 60. Gosub 80. Gosub 70.

Subroutines have contributed to some extent to the clarity of programs not because they are subroutines, but because they tend to be readily identifiable sections of the program. To achieve greater clarity one must therefore, Gosub 150, divide programs into identifiable sections, but not make these sections into subroutines unless there is some overriding reason to do so. Return.

60 For example, writing a program in the form (Gosub 15) actually obscures the logic of the program. Gosub 90. Return.

70 To use a subroutine listed in a distant part of the program, Gosub 150, inevitably obscures its logical flow and I can see no justification for this for a short sequence that could easily be embodied in the main program. Gosub 130. Return.

80 With nested subroutines, it is difficult to follow the flow of the program, as 'RETURN' does not give any indication of the level to which one should return, whereas 'GOTO' would make this clearer. Return.

90 At the very least, the subroutines need to be listed in their logical order. Even then, however, one has to jump up and down the page unnecessarily in trying to follow the structure of the program. Return.

100 Within a block of one or perhaps two pages of printout, one can follow the general flow of the program but not its detail, so GOTO should be used only to move to the beginning of sections, (Gosub 160). Provided this is done with discipline, use of GOTO should not (Gosub 150) bring more hazards than 'GOSUB'. Return.

110 Perhaps, because of the usual size of the VDU screen, one tends to work with a block of about 20 lines at a time, and one can reasonably hope to keep track of all the detail in it. Within that compass, GOTO can therefore be used without danger, as its implications will be clear. Return.

120 Moving further than that in a program must involve refilling the screen or turning over pages of printout, and makes it difficult to get a clear view of the program flow. Return.

130 It is easy (Gosub 170) to forget what variables have been used in a subroutine if it is out of sight several pages away. Return.

150 In my opinion (Gosub 200). Return.

160 Clearly marked with REM statements. Return.

170 And dangerous. Return.

180 If you are reading this line, you are reading *normally*, not following the 'GOSUB'.

190 I do not imply that there is anything wrong with using subroutines for substantial sequences of code that are used at more than one point in a program. Return.

200 For what it's worth. Return. END

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IK/40

Communicating with your portable Do they talk? If so, how.

One of the chief attractions of portable computers is their data communications ability. For journalists, sales representatives and others who work in the field, portables open up the possibility of communicating with office or home systems from remote locations, accessing information and transmitting text to and from the office or home or to larger computers and dial-up services.

Unfortunately, in Australia, the situation is not so rosy as it is painted by overseas magazines.

Reviews and enthusiastic reports of the latest communications breakthrough overseas need to be heavily discounted in Australia. Portable computers which in the United States are provided with built-in modems are sold in this country without modems, and auto-dialling and automatic telephone answering equipment from overseas is not suitable for use here.

The reasons for this state of affairs are international communications standards, the requirements of Telecom Australia, and the different telephone equipment used here.

Computers communicate over the telephone lines using modems, which convert computer data to and from audible tones for transmission over the phone lines. The frequencies of these tones are laid down by an international convention, called CCITT standard. Australia and Europe follow this standard while the United States uses a different set of frequencies, the Bell standard. Modems available in Australia offer one or more of the CCITT communications modes, although some deluxe direct connect types can be switched to the Bell standard, which is required if you plan to access United States data services. Modems made in the United States, including those built into the domestic versions of portable computers are not suitable for use here, and are removed before the system is sold.

Before a particular type of modem can be connected to the telephone lines, it also must be approved by Telecom. The standards for approval are strict, and gaining approval can be a lengthy business. Approval standards cover CCITT requirements and also Telecom's own saftey requirements. There must, for example, be an approved degree of electrical isolation between the communications equipment and the telephone line so that the line voltage remains constant, without surges which could be dangerous to users and other equipment.

In some cases the problem is physical incompatibility with local telephone equipment. The US telephone system uses a standard modular jack, and equipment using these connectors cannot be used here. Tandy's Model 100 provides a special connection for a external modem, and the company can supply a version of the Sendata acoustic coupler for use with the computer. Most modems, however, connect to an RS-232C serial port, which should be provided by all portable computers, together with details of the exact connection scheme used.

Once equipment compatibility problems are overcome, software for communications becomes an issue. The majority of portables have some terminal emulation and file transfer capabilities built-in while others require additional programs to make full use of the facilities available.

Interfaces and expansion

An RS-232C serial interface is the most important adjunct to a personal computer, and some models provide two, one for a modem and one for a printer. Only the Tandy Model 100 and the NEC PC-8201 provides Centronics type parallel ports however, which can be used by parallel printers. A cassette interface is convenient, and in some cases may be necessary to load software supplied on cassette. While manufacturers tend to recommend a particular type of cassette player, most low-cost recorders can be used successfully.

Bar code readers and analog inputs are less often required, although they can be useful for special applications. Software to use these interfaces may not be supplied as standard however.

Power supplies

For a computer to be truly mobile, it must operate from batteries, although a power socket and AC adapter should be provided for use where mains power is available. Preferably, the batteries should be rechargeable, and the charging circuitry built into the computer. The Apple IIc does not have batteries, and so in these criteria, is not a 'true portable'.

The length of time available from one battery charge is an important issue for a computer which will be frequently used in the field or while travelling. The computers reviewed here provide from 6 to 20 hours of operation on batteries, but these times vary according to the amount of memory installed in the system and the use of accessory devices such as printers. Rechargeable batteries can't be used permanently. After around 500 charge/discharge cycles, or two years of operation, a new battery will be required, although the life of batteries is shortened if they are frequently discharged to a very low level.

Plug into a big screen

Output to a video monitor is a nice option to have when a portable computer is used in a fixed location fairly often. Hewlett-Packard offers a video display interface with their "Interface Loop" (HP-IL) concept, a complicated and versatile communications bus fitted to all their machines. Tandy offers a disk/video interface for the portable Model 100. The Apple IIc of course, comes standard with a video output, and Apple offers a separate video monitor for the system plus PAL, with an LCD screen to come.

The remaining part of this article takes a look at the communications powers of six popular portable systems.


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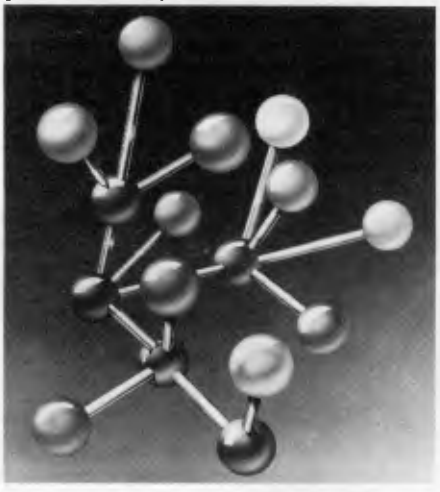

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Communicating with your portable: basic facts for beginners. Do you need a modem or an acoustic coupler?

First: modems

The first basic fact to take on board is that you can generally use any modem with any computer. You just plug the modem into the RS-232 serial port on the back of your computer, and then plug the other cord into the telephone jack on the wall. That's the little beige plastic whatnot that Telecom screw on your wall when you order a telephone. You can order more to communicate with you computer.

You will also need the communications card and software. In the case of some portables, some facilities are built in.

None of the six portables we have looked at here have a built-in modem. This means that you will have to buy a light weight modem or acoustic coupler. Next issue, we will review the equipment. You'll see that not all of the portables have communications software yet.

Costs for modems relate to the speed, or baud at which your information travels. The rate you send it at has to match the system on the one you are talking to.

A good rule for costing is that each bit per second will cost you a dollar. So if you want a 300 bit per second modem, this will cost you around $300. 1200 bits per second will cost you around $1200.

One character takes up 10 bits. So if you are sending at 300 baud, then you are sending about as fast as you can type — which is about five characters per second.

You'll have to shop around to see which one your briefcase, if portability is important, *APC* will look at and compare modem and acoustic coupler portability and other features in the October issue.

Acoustic couplers

The difference between an acoustic coupler and a modem is that the modem plugs into the phone jack, and the acoustic coupler is an acoustic 'nest' for your telephone receiver to sit in.

Acoustic couplers were big in Australia back in the days when Telecom wanted to keep a monopoly on communications, and to also ensure that none of their technicians were electrocuted by surges down the line from uncontrolled devices.

But now Telecom is approving modems, and there is a large range on the market. Acoustic couplers do have a role, particularly for portables used in the field where the user wants to communicate from a public telephone booth. Another application for acoustic couplers would be quick desk-top demonstrations where you didn't want to disrupt the status quo by crawling under the desk in search of a jack.

A number of computer manufacturers sell acoustic couplers with their computers. They may present it to you as the only way to communicate. People in the communications game, however, suggest that a modem is their preferred choice because it is less vulnerable to noise and vibration.

You will want a modem with the CCITT communications standard, because that's the one that Europe and Australia use. If you want to communicate with the United States, search databases, or just send messages to Ronald Reagan's Lear Jet Kaypro, then you'll need to have the Bell facility as well, which is the one that all US telephones talk.

EPSON

Epson PX-8

Epson actually introduced the first briefcase-sized portable computer, the HX-20, in 1982, but its small 20 column by four line display and non-standard software quickly put it out of the running as more powerful machines appeared. The PX-8, Epson's newest offering, more than compensates, with a more versatile configuration and standard software running under the popular CP/M operating system. A 25 line LCD was announced for the Epson in the US on August 16.

The PX-8 is a true portable computer, easy to carry and able to be used anywhere. Internal rechargeable batteries provide approximately 16 hours of operation between charges. A microcassette recorder is built-in as well as a 24k RAM disk emulator with battery back-up, although additional permanent storage is required, 60k and 120k RAM modules can be clipped on to the bottom of the standard console.

Communications

In addition to the serial port used for connecting optional external disk drives or a printer, the PX-8 is provided with an RS-232C communications port which is well supported by the system software.

TERM, the PX-8's terminal emulation program, allows the system to be used to transmit information from the keyboard and display information on the screen as it is received, and to transmit and receive files, although without any of the error checking and automatic re-transmission protocols of standard CP/M file transfer programs. The operating parameters of TERM cannot be changed once a session has begun — it is necessary to leave

SHARP

Sharp PC-5000

The PC-5000 from Sharp is one of the biggest and heaviest portable computers, although it is also the only one which includes a built in printer option. The built-in printer, the use of bubble memory cartridges for mass storage and the provision of MS-DOS 2.0 operating system distinguish the PC-5000 from its competitors.

The PC-5000 is the only portable in its class which includes as an option a fully integrated printer. Part of the size and weight of the Sharp system is due to the fact that the console is already designed to accept the printer module, which is secured in place by two screws. The printer is a thermal transfer type, which means that it can print on special sensitive paper without a ribbon, or, with a ribbon cartridge installed, can use plain paper.

Communications capabilities

The PC-5000 has no special communications facilities. Microsoft Basic and the I/O redirection capabilities of MS-DOS 2.0 allow simple terminal emulation and file transfer programs to be written relatively easily, and the MODE command of MS-DOS can be used to configure the serial port for data transmission speeds between 100 and 19,200 bps and various communication formats, but other applications programs would be needed to support auto-dialling, multi-format terminal emulation and automatic log-on sequences.

Sharp's own modem, mentioned in the manual, is not available in Australia because we use different data transmission standards, different telephone con-

TANDY

Tandy TRS-80 Model 100

Although only introduced in 1982, Tandy's TRS-80 Model 100 has become the Model T of portable computers. An 8-bit system with a 40 column by eight line LCD screen, the Model 100 has been superseded by later, more powerful portables, but because of its low price and range of expansion options available, is still a good buy.

Communications

TELCOM, the Model 100's communications program, is designed to support auto-dialling and computer-to-computer communications, but the built-in modem of United States versions of the Model 100 is not available in Australia, so an external modem must be used. Tandy supply a battery-powered "Sendata300 baud acoustic coupler manufactured by Australian company Electro-Med Pty Ltd to suit the Model 100. Switches on the left side of the console select whether the modem connected to the Model 100 is a direct connect type or an acoustic type, and the frequencies used for communication.

Setting up the Model 100 for use as a terminal is made easy by the programmable function buttons. The STAT function (F3) displays the current communications protocol (baud rate, word length, parity etc) that is in use and allows it to be changed. Once a connection has been made, the Model 100 is switched to the terminal mode with function key F4. Files can then be transferred between the Model 100 and a remote system by pressing F2 (download from remote system to Model 100) or F3

HP110

Hewlett-Packard HP-110 Portable

Hewlett-Packard's HP-110 is the Rolls-Royce of portable computers. The quality engineering for which Hewlett-Packard is renowned combined with 16-bit processing power and built-in software make the HP-110 the machine of choice for professional and business computing "on the go".

The HP-110 is always switched on, although it goes into a low power standby mode if unused for more than ten minutes. Pressing any key reactivates the system, displaying a menu of available programs. HP's "front-end" menu, called P.A.M., for Personal Applications Manager, contributes greatly to the ease of use of the HP-110. Hewlett-Packard's desktop business computer, the HP-150, also uses P.A.M., and has an identical function key layout, so programs can be used on either system without learning new ways of working.

Hewlett-Packard takes a most innovative approach to portable computer software. As supplied, the Personal Applications Manager gives access to system diagnostics, Lotus 1-2-3, the "Memomaker" word processor, a terminal emulation program or the MS-DOS operating system. Programs are selected by moving a highlighted cursor to the required program name on the screen and pressing "Start Application" (function key) F1).

Reportedly, a Read Only Memory version of the latest Lotus package, Symphony, is also under development which will provide the word processing and communications functions now taken care of by separate programs.

APPLE

Apple IIc

Apple's contribution to the portable marketplace is the IIc, in a briefcase-sized version of the pioneering Apple II which shares the same strengths and the same weaknesses and adds some new peculiarities of its own.

The IIc is very much a part of the Apple II family, which has both advantages and disadvantages for the user. The major advantage is that the IIc can run most programs designed for the original Apple II (except those requiring two disk drives or versions of Apple DOS earlier than 3.3). The main drawback is that that's all the Apple IIc can do — there are no applications programs included in the price of the machine, no on-screen menus or special user software.

Because of the way it is designed, the Apple IIc is more of a "transportable" computer than a true portable. While compact, the present need for an external video display and a separate power supply unit mean that the IIc cannot be used "on the road". It is an Apple II which can be carried from place to place.

TV and Video outputs

The keyboard console is only part of the set-up, however. There is also a hefty external power supply pack with two long leads, a PAL video modulator to allow the system to be used with a standard VHF television receiver and a switch-box to connect to the TV. A separate video monitor can also be used, and Apple supplies a compact, 22cm (diagonal) green phosphor display designed specifically for use with the IIc but priced separately. A 40/80 column

NEC

NEC PC-8201

NEC's portable, the PC-8201, is very similar to Tandy's TRS-80 Model 100. The similarity is not surprising, since the internals of both machines are made by Kyocera, the Japanese ceramics company which achieved an early lead in the production of liquid crystal displays. Like the Model 100, the PC-8201 is an 8-bit system with a 40 column by eight line LCD screen and a full size keyboard. It shares the same virtues of the Model 100, but adds some refinements of its own.

The PC-8201 is better presented, with a superior keyboard and more convenient cursor controls, more interface connections on the rear panel, and (for those who care) a nicer colour scheme.

Communications

TELCOM, the PC-8201's communications program, is designed to support auto-dialling and computer-to-computer communications using an external modem with an RS-232C interface. NEC supply a "Sendata" 300 baud acoustic coupler manufactured by Australian company Electro-Med Pty Ltd, which takes its power from the computer. A switch on the modem selects whether answer or originate frequencies will be used for communication.

STAT allows baud rates from 75 to 19,200 bps, word lengths of 6,7 or 8 bits, with odd, even or no parity and 1 or 2 stop bits.

On the rear panel of the 8201 are connectors for an RS-232C serial port, a Centronics type parallel printer, two high speed serial interfaces (operating at 19,200 bps), a 600 baud cassette recorder interface and a connector for a bar code reader. On the left side of the con-

EPSON

TERM and go to the CONFIG program.

A second, more sophisticated file transfer program is also provided, called FILINK, which supports specific communications protocols and is designed soley to transmit and receive files. The communications protocols supported, however, are not standard, and are apparently intended for use with Epson's larger QX-10 desktop system.

An acoustic modem, the CX-21, is available for use with the PX-8. This battery-powered coupler is a 300 baud, answer/originate modem styled to match the PX-8. Other Telecom approved modems could also be used, as the manual goes into great detail on connector pin-outs and exact requirements for the connection of accessory devices.

Epson's CP/M has been modified, and at least does not just display the anonymous A" prompt when first loaded. When the PX-8 is switched on the first screen display lists the files available on drive B, a ROM module. These files include various CP/M commands and the applications programs WordStar, Portable Calc and Portable Scheduler. The first file name in the list flashes on and off, and pressing RETURN will select this file.

For CP/M users and experienced programmers the PX-8 is powerful, versatile portable computer system. If you use WordStar, in particular, then you'll like the PX-8, although you'll need an external RAM disk if you plan on producing documents more than about six pages long. If you are looking for a portable computer as such, then the availability of CP/M is less of an advantage and you'd be better looking at the presentation and ease of use of the software. Unless you want to learn the intricacy of a disk operating system, many of the features of the PX-8 will be wasted.

The communications capabilities of the PX-8 also fall short of the ideal. The emphasis on use with the QX-10 is understandable, since this system is Epson's desktop flag-bearer, but not a lot of them are in use. If you want to do more than access established dial-up services and bulletin boards, you'll need an experienced programmer to write file transfer programs to suit your requirements.

The standard PX-8 costs $1,300 excluding sales tax. A 60k RAM disk is $404 and a 120k RAM disk is $570. Add on disk drives are available for $1,391 and Epson's acoustic coupler is $209. A battery-powered thermal printer, the P-40, will be introduced shortly but no price is known as yet.

SHARP

nectors and operate under a different telecommunications authority.

Applications for the PC-5000 may be in short supply for some time. The need for a range of unique products, such as the bubble memory cartridges and thermal transfer printer ribbons, adds to the running costs of the system, and the six hours operation on batteries marks the PC-5000 as only a "part-timeportable system, designed to operate principally from mains power. The heavy, metal enclosed dual disk drive unit further accentuates this impression — it can't be used without 240 VAC power.

Data communications facilities are strictly in line with any other MS-DOS system. An external modem and special communications software will be required.

In general the PC-5000 is a good, solidly-engineered conventional computer system which can be used in some applications as a portable. Its use of MS-DOS and disk drives potentially give it access to a wide range of software, but it has none of the special features or friendly "front-endprograms which make some other portables so attractive.

For comparison chart turn to page 158

TANDY

(now defined as "upload). Echo" (F5) allows you to obtain a printout of incoming information on an attached parallel or serial printer.

STAT allows baud rates from 75 to 19,200 bps, word lengths of 6, 7 or 8 bits, with odd, even or no parity and 1 or 2 stop bits. STAT also provides an option to select the pulse rate of the auto-dialler, but this is not applicable in Australia. There are some restrictions, however, and some points not made clear in the manual accompanying the system which affect telecommunications in this country. It is not immediately obvious, for example, that a modem connected to the round DIN connector on the rear panel can only be used at 300 baud. Selecting any other baud rate will disable this "Phone" connector and enable the RS-232C interface port. A 1200 baud modem, for instance, must be connected to the 25-pin D-type connector of this port, not the connector labelled "phone".

Disk/Video Interface

The Model 100 has been around for a while, as computers go, and a range of accessories and expansion options is available from Tandy Electronics. The most interesting is the disk/video interface", which provides a 5 1/4 inch floppy disk drive and a video display interface which puts the Model 100 screen display on a video monitor or television set (using a built-in RF modulator). A second disk drive can be added if required in the space provided for it below the first drive. The video display can be selected for 40 or 80 characters per line and displays 25 lines on the screen, considerably more than the Model 100 LCD screen. The unit is not battery-powered, however, and is designed for use with a Model 100 in a fixed location.

Provided with the disk/video interface unit is a system disk with the Model 100 disk operating system and disk Basic, which expands the file handling capabilities of standard Basic and adds some new commands.

Prices

The price of the Model 100 varies according to how much memory is fitted. A unit with 8k of RAM costs $699.99 but doesn't allow you to do very much. Additional memory is available for around $150 per 8k installed, or a 24k version is available for $899.

HP110

Communications capabilities

The powerful communications capabilities of the HP-110 make it more than a portable computer. The ability of the HP-110 to communicate with the larger HP-150 system and computers from other manufacturers through the HP-IL link make it a true mobile adjunct to an office network. Terminal" provides an easy to follow guide to configuring the system's RS-232C serial port and establishing communications with dial-up data services using an external 300 or 1200 baud modem or a serial cable. Function keys are defined to allow single-key selection of operations such as connect", "dial" and "hangup" if an auto-dialling modem is used, and the computer's internal clock can also activate the system and transmit or receive files at a specific time, even when unattended.

United States versions of the HP-110 come with a built-in 300 baud Bell standard modem and the rear panel carries a standard US telephone socket. These facilities are of no use in Australia because we use different data transmission standards, different telephone connectors and operate under a different telecommunications authority, so the internal modem is not included in Australian versions of the HP-110. If you want to use the HP-110's extensive communications capabilities an external, CCITT standard Telecom approved modem is required, such as the HP-IL acoustic coupler unit from Hewlett-Packard.

The high points of the HP-110 are its quality engineering and powerful communications functions. It gives the impression that it has been designed from the start for mobile operation in a business environment. Data communications capabilities are integral, not tacked on as an afterthought, and the programs available so far are those most often required by business users. The HP-110 is a very stylish, very powerful portable computer which wouldn't be out of place on the back seat of a Rolls-Royce.

The HP-110 is comparatively expensive compared to less capable portable systems. Australian prices are not yet available, but will be "under $5,000". The price of the basic unit in the United States is $US2,995.

APPLE

by 24 line liquid crystal display is also promised and should be introduced by the end of the year, according to Apple Computer.

The Apple IIc is unusual in having both direct video and television outputs. Limited display capabilities has been a problem with the Apple II family, but the IIc provides the most flexibility so far. The 40 character per line display mode is recommended when the IIc is used with a television receiver, and for those Apple II programs designed for a 40 column display.

Communications

The communications capabilities of the IIc are identical to those of the standard Apple II. There is no built-in modem or special facilities for data transfer other than the serial ports configuration program of the system utilities. Apple Computer has a direct connect modem available which works with Apple IIc communications software to provide auto-dialling and store log-on sequences. Quite a few communications programs are available from Apple and independent suppliers for the Apple II series. They vary in sophistication from simple "dumb terminal" programs which allow information to be transmitted from the keyboard and displayed on the screen to fully-fledged intelligent" programs which permit files to be transferred and can recall frequently used log-on sequences from a disk file for use with an auto-dial modem.

The Apple IIc's Configuration utility program allows a wide variety of data transmission speeds and communications formats. Once configured, communications settings for particular devices can be saved as a "Product Identification Number" (a PIN) which can be specified as the default configuration for either the printer or modem port or saved in a "device list" to be called up at any time. The PIN stores details such as the mode (printer or communications), the number of data bits and stop bits, baud rate (from 110 to 19200 bps), parity, full or half duplex operation, automatic linefeed enable and line width.

The Apple IIc is not a truly portable computer that can be used anywhere. The need for an external power supply and video display make the IIc a lighter, transportable version of the Apple II, not a machine for use "on the go". The availability of an LCD screen will not change this.

Prices for the Apple IIc are $1,575 for the console (plus sales tax) and $269 for the video monitor. The price of the LCD screen is yet to be announced.

NEC

sole is an edge connector covered by a hinged flap which is intended to accept an additional RAM cartridge.

The PC-8201 comes with 16k of RAM as standard and room for another 16k internally. Sockets on the bottom of the case can hold two more 16k RAM modules and an optional 32k memory cartridge is available which plugs into the connector at the left. This cartridge contains its own lithium battery power supply which can maintain the contents of the memory for up to six months. The maximum possible memory for the PC-8201 is thus 96k of RAM, which is divided into three banks of 32k each.

The PC-8201 is powered by four AA size "penlight" batteries, which give 18 hours of operation. A red LED indicator on the top right of the console lights to show when batteries are low. A separate battery provides power for up to 64k of CMOS RAM, so that data and programs are preserved in memory even when the system is switched off for up to seven days (or 26 days if only 16k of RAM is fitted). Alternatively, the 8201 can be powered by a 9V AC plugpack adapter when mains power is available, and a rechargeable Nicad battery pack can also be substituted for the penlight cells. These batteries are recharged by the system's own power supply and are good for around 500 charge/discharge cycles, saving on the cost of "disposable" batteries.

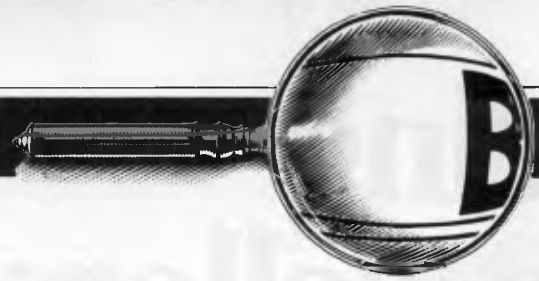
Like the TRS-80 Model 100, it is a rugged, reliable "knockaboutportable computer which provides everything required for computing on the road. It adds refinements which the Tandy machine does not have, such as the potentially larger memory capacity, the optional rechargeable battery pack and two high speed serial ports, but these extras do cost more.

The price of the PC-8201 varies according to how much memory is fitted. A unit with 16k of RAM costs $695 and RAM can be expanded interally for $129.37 per 8k, or an external 32k cartridge added for $84.99

by Peter Vernon

The LCD, and the main system unit and keyboard, are hinged together

The keyboard features 75 main keys plus eight special function keys



BENCHTEST

HP110

In recent months, Hewlett-Packard has accelerated its move into the personal computer market — a move which started last year with the launch of the HP 150 touch screen machine. It now presents the Portable (code named the HP 110), a particularly well-endowed micro which features the biggest screen yet available on a portable micro and which is fully compatible with its predecessor.

The HP 150 was a 'special' MS-DOS machine in that even the most popular software had to be revised to work on it. Hewlett-Packard's latest addition — the Portable — goes to great lengths to use files created on the IBM Personal Computer.

Despite weighing only 8.5 pounds and measuring 13in wide x 10 in deep, the Portable (previously known by the codename Nomad) is packed with a number of unique features.

Many people believe that a portable computer is merely a cut-down version of a desk-top machine and that it can't really do much: only big machines which occupy desk space should be really taken seriously.

The Portable is going to change that perception, as is obvious from the technical specifications: it's based on the full 16-bit Intel 8086 central processor; it has Lotus 1-2-3, MS-DOS version 2.11, the Memomaker word processor, as well as a selection of other software locked in ROM memory — and it runs off three rechargeable batteries.

The machine also has an 80 column x 16 line liquid crystal display that is capable of producing graphics (such as the many types of Lotus 1-2-3 graphs) at a resolution of 480 x 128 pixels.

The Portable was developed within 18 months by Hewlett-Packard's personal computer group in Corvallis. Interestingly, their original idea was to build the system around the multi-application Symphony product from Lotus Development. However, delays in the Symphony project forced the Portable design team to use Lotus 1-2-3 as the main applications program instead.

The Portable is compatible with the bigger HP 150 touch screen system ,and can make use of files stored on the IBM PC and IBM workalikes.

Hardware

If the Portable were being assessed in terms of design only, it would get quite low marks. Trendy, or avant garde appearance seems to have been the least important thing in the development team's minds.

The main system casting measures a compact 13in x 2 1/8in and is popular in computer design circles today. The whole thing is designed along the lines of a briefcase: the liquid crystal display (LCD) makes up the top half of the case, and the main system unit and keyboard make up the lower half.

The two parts are hinged together, and spring-loaded clips along the front edge keep them from flapping around while the user is carrying the machine.

Opening the spring-loaded clips allows you to flip the LCD display up into its operating position. The hinge mechanism is not like the kind of thing you'll find on your front door: it uses a combination of friction and a spring system to hold the display at almost any angle between 0 and 130 degrees.

LCD displays have distinct advantages for portable computers: they consume very little power and are much thinner than cathode ray tubes. The low power requirements allow machines using them to be run off just a few rechargeable batteries, making them truly portable instead of 'transportable'. The flatness makes it easier to produce a lightweight machine.

Unfortunately LCDs have their drawbacks, and none of these have been particularly well overcome on the HP 110.

As the machine is portable, it will be used in a wide variety of lighting conditions (daylight, fluorescent, 100-watt home lights, and so on). Consequently, it is important that the user be able to vary the intensity and/or contrast of the display as conditions dictate. Being able to vary the viewing angle helps, but this is not enough in itself. So, to the right of the keyboard, a CONTRAST key which, when used in conjunction with the SHIFT key, will increase or reduce the screen contrast. The special LCD support hinge tended to 'sag' and thereby accentuate the screen glare. Using the Portable on a stable desk is one thing, but using in a moving train or in a car would probably make the problem all the more obvious.

The contrast key helped but, to be frank, it's not really possible to read the screen for very long before your eyes become a little fatigued. It's worth knowing that the contrast key also works as the system reset key if it's held down for about 15 seconds.

Once you've opened up the Portable, it can be turned on automatically by pressing any of the alphanumeric keys. Conversely, if the machine is left switched on, but not used, for a pre-set amount of time, it will shut down the display to conserve battery power. The power source is a six-volt rechargeable battery pack which can last for up to 16 hours of continuous use.

The remaining battery power is displayed every time the machine is turned on, and when this figure drops to about one or two hours worth of energy the machine displays a 'low battery' message. If it's not recharged within the next hour or so, the machine automatically shuts down everything, locking the user out, until remedial action is taken.

There are some keys that will not turn the machine on — SHIFT, for example — but it's unlikely that this will cause any problems. The keyboard is HP 150-compatible and features 75 main keys

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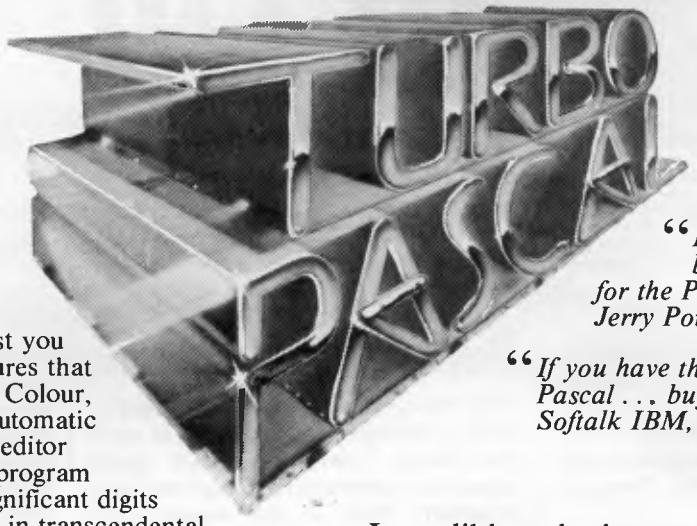

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plus eight special function keys marked f1 to f8.

In normal mode, the Portable keyboard produces the conventional qwerty characters. By pressing the EXTEND CHAR key, however, it's possible to generate special characters such as international currency symbols and Greek letters. EXTEND CHAR also allows the user to access functions described on the front edge of some main keys: these include + Line, -Char, Clr Line, Prev and Next.

The layout of the keyboard is acceptable, but it does have a rather 'plastic' feel to it. It wouldn't be the best thing to use for writing long documents. The cursor control keys are set in a row to the top right of the keyboard, an arrangement and position which could be a little awkward if you need to use them frequently.

The main keys, as far as the built-in functions go, are the function keys set in a row across the top of the keyboard. These keys do not have only one purpose — they receive new assignments each time a new application is loaded. The user is made aware of the new functions by explanatory 'labels' that appear along the bottom edge of the LCD screen.

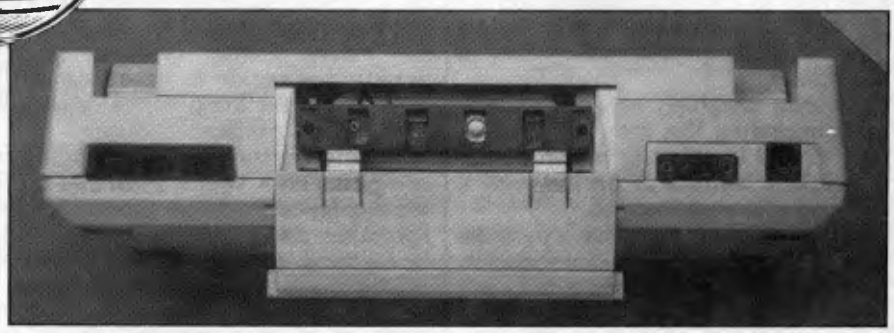
While the f1 key might initially be identified as the 'System Config' key, once the system configuration routine has been loaded, the same key would then be identified as the 'Next Choice' key, providing the user with a way to choose among a range of system set-up options.

Although this approach is basically a good one, the Portable designers really didn't complete the job as well as they might. Instead of having the function keys set directly below the key assignments on the screen, the keys are set off to the left of the assignments. So, while the left-hand f1 key is fairly close to its assignment, the right-hand f8 key is not close at all. After a while, you find yourself subconsciously leaning your head to one side to compensate for the offset.

It would help substantially if there were another firm visual link between the number of the function key and the bottom-line option that was currently available.

The main CPU is a CMOS version of the Intel 8086 chip operating at 5.33 Mhz. It was a smart move to include this chip instead of the much over-used Intel 8088 chip, because the increased performance of the former is accentuated by the fact that you are using a very small machine.

There is a large amount of memory that has been packed into the machine. It total, it contains about 656k of memory split up as 384k of CMOS ROM and 272k of CMOS RAM — an impressive amount of memory to be able to carry around in a portable machine considering that the average IBM PC has been equipped with between 320k and 512k of RAM.



All the connectors are set along the back edge of the machine

The ROM memory contains the MS-DOS version 2.11 operating system, Lotus 1-2-3, the Memomaker word processing system (as first introduced on the HP 150), a simple terminal emulation package, and built-in help text. Also stored in ROM is the Personal Applications (PAM). This is a front-end program which allows the user to list disk directories, copy files, or set up a link with another computer by selecting options from a menu. The PAM system first made its appearance on the HP 150.

As this software is locked away in ROM, all the RAM memory is available for user created files and programs. Of course, it's likely that users will load in additional packaged products such as WordStar and dBase II.

The RAM memory is split into two parts — main memory and electronic, or ramdisk, memory. Via the system configuration procedure mentioned earlier, it's possible to choose how much memory will be given over to the main memory and, therefore, how large an electronic disk you will have.

The combinations start off with 256k main memory and 16k disk space, and go on up to 96k main memory and 176k disk space. Whatever the size of the electronic disk, it is always referred to as driveA. All the data stored on this 'drive' is preserved as long as the batteries have enough power to maintain it. Resetting the system does not erase the electronic disk.

The ROM memory has been designated as drive B. Naturally, nothing can be save to or erased from this 'drive'.

Up to eight external disk drives can be connected up to a single Portable system at one time. The external disks may be Hewlett-Packard's own impressive HP 9114A disk drive which can store up to 710k on a 3.5in disk, or the drives on an IBM or IBM lookalike machine.

The linking method is impressive and very simple. As the Portable has a limited amount of surface area, it would have been unthinkable to use the conventional thick cables and large connectors to link up peripherals. HP has used what is being called the HP Interface Link, or Loop. Connecting an external disk, or perhaps a printer, to a Portable simply involves stringing two special 16-gauge wires with miniature sockets between the drive and the computer. The HPIL technique was first used over five years ago with the HP 41C programmable calculator and its peripheral products.

That's the simplest HPIL link you can set up, and it only works due to the right software and the right hardware in the HP products.

If you want to connect the Portable up to an IBM system you have to do a little more work. The same two wires are used to connect the systems, but a special printed circuit board must first be installed in the IBM machine. Once this has been done, you must load a special HPIL software package into the IBM's main memory. Installing the board is no problem — you just take the system unit off and plug the board in.

There are some technical considerations to deal with if you have installed other add-on boards in your IBM system. For example, the HPIL hardware/software combination is loaded into memory at a memory address that is not explicitly occupied by any major IBM routine. However, if any of your add-on boards get there first, you must change a parameter or two in the HPIL software package to avoid conflict.

We found installing the card and software on a bare bones IBM system presented no problems.

Naturally enough, the HPIL software

disk does not come with the IBM system files; you have to use your own DOS disk (or use a copy of the HPIL disk with the IBM system tracks and files copied onto it) to first start the procedure. When it has loaded, the screen indicates that the IBM can be set to provide any attached Portable with disk access (press 1), screen access (press 2), or printer access (press 3).

The default setting is that the IBM will operate as a disk drive for the portable. Since drives A and B are already assigned to the ROM and RAM memory in the Portable, external drives begin with the assignment of drive C and go on from there. If the user typed 'dir C:' on his Portable while connected to an IBM system, the Portable would list the contents of the disk in the IBM's drive A. If the Portable was running the WordStar word processing package, it could load a file from the IBM drives or save a file to the IBM drives. If the HPIL software on the IBM is set to the 'printer' option, the HP110 could use the IBM's printer as if it were its own.

In addition to the HPIL connectors, the Portable features an RS232 port to which additional serial devices can be attached, and a 300-baud internal modem with a modular phone jack connector. All the connectors are set along the back edge of the machine, including a direct current power jack. If the 300-baud modem is not sufficient, you can attach a higher speed version to the RS232 connector externally.

'The Portable is compatible with the bigger HP150 touch screen system, and can make use of files stored on the IBM PC and IBM, workalikes.'

Software

Those who read the *APC* review of the HP 150 (June APC) will be familiar with the PAM system, which was developed as a friendly front-end to MS-DOS. PAM replaces the A> prompt with a menu-like display; all those applications that are currently available via PAM are presented as reverse video boxes arranged neatly across the LCD display. A small downward-pointing arrow, or pointer is used to tell PAM which application should be loaded. Pressing the return key actually invokes the application.

After switching on the Portable, the system reads all attached disks to look for applications installed under PAM. The system looks for small PAM, MNU files, which are text files containing information about what a set of applications should be called on the menu (WordStar, Lotus 1-2-3) and the MS-DOS command that will load them ('WS' and '123').

At this top level, the eight function keys are assigned the following duties: f1=Start Applic; f2=File Manager; f3=Clock Config; f4=Reread Discs; f5=Datacom config; f6=System Config; f7=Help; f8= Off.

Pressing f3 results in a screen like that shown in Fig 1. Note that the function key labels have been updated in keeping with the new environment.

Via PAM, Portable users can do anything they might be able to if they were using raw applications. There are facilities to create DOS sub-directories via the Make-dir option, to print or delete files, and to format disks.

The Portable can also act as an alarm clock, as all good portables should be able to. Just as the user can create PAM.MNU files to set up menu options, the user can also schedule alarms by creating PAM.ALM files.

These must contain text in the format MM/DD/YY hh/mm message, where MM=month, DD=day, YY=year, hh=hour of alarm, mm=minute of alarm, and message=the purpose of the alarm (for example, lunch date at 1.30pm).

In most PAM procedures there are system defaults, so the new user need not be concerned about having to go through a complicated procedure just to start work. You can bypass the PAM environment altogether and work with the MS-DOS A> prompt directly. To do this, you select the MS-DOS menu option. To return to PAM, you type 'exit'.

As the Symphony package was not available in time for introduction of the Portable, it was decided to use Lotus 1-2-3 as the multi-purpose software. Hewlett-Packard promises that there will be an easy upgrade path (probably a ROM chip swap) to Symphony w hen it is made available.

Using 1-2-3 on the Portable is a pleasant experience as it's stored in ROM and all the worksheets are held in the RAM-based disk. Files are saved and retrieved with lightning speed and the whole task of setting up complex spreadsheets is made that much easier.

Similarly, using HP's Memomaker word processor is very easy. All functions such as opening, closing, renaming and updating documents are handled by the constantly reassigned function keys. You can even have Memomaker edit files, which were created on a Portable or an IBM system using WordStar.

Speaking of WordStar, the only curious thing that happened while using this program was the time it took to load initially. On an IBM system, WordStar loads in about six seconds — the Portable version took almost twice as long.

Although files can be accessed on an IBM PC, you cannot necessarily run IBM programs on the Portable. Apart from the code differences, IBM programs address the larger 80-col x 24 line displays and do all kinds of strange cursor movements to achieve parti cular effects. My attempts to run a couple of IBM database packages on the Portable met with a 'Do you expect me to run that?' response. Similarly, trying to run the Portable programs (transferred to an IBM format 5 1/4in disk) only produced a passable copy of the Rosetta Stone on the IBM display.

The terminal emulation software

Technical specifications

Price (in US)	$2995
Size	13in wide x 10in deep x 2 7/8 in high
Weight	8.5lbs
CPU	CMOS version of Intel 8086, operating at 5.33 Mhz
ROM	384k; contains MS-DOS version 2.11, Lotus 1-2-3, Memomaker word processor, Terminal Emulation Package, Help Text, and Personal Applications Manager (PAM)
RAM	272k; can be split into main memory/ramdisk
Display	80 column x 16 line LCD display. Can produce graphics at a resolution of 128 x 480 pixels. Contrast is adjustable from keyboard
Keyboard	75 keys, eight special function keys. Compatible with HP 150 layout
Modem	Internal 300 baud auto-dial, auto-answer modem included in price
Power	Three rechargeable lead/acid batteries. Batteries can operate the HP 110 for up to 16 hours of continuous use. Automatic shut-down of display to conserve power
Peripherals	HP 9114A battery-powered external disk drive. Uses 3.5in disks and can store up to 710k. The ThinkJet battery-powered ink jet printer

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Word Processing

Framework's word processor is dynamite! It gives users the choice of frame or fullscreen viewing of documents, multiple margins within a single file, automatic justification and repagination, header/footers, page numbers and more. The streamlined menu system helps new users get started in a hurry and "shorthand" commands help veterans work even faster.

Outlining

The innovative and very powerful outline processor can be used as a standalone organizer or as a companion to the word processor. Using this outline mode, single ideas can be quickly captured and then expanded into fuller concepts and solutions. Any outline-frame or subheading within an outline can be instantly expanded to include text, spreadsheets, graphs or databases. Finally, with Framework, your PC is truly a thinking machine.

Database

Framework's database system can be learned quickly and put through its paces effortlessly because most commands are common throughout the entire program. Framework itself will handle most of your analytical information management needs, and if very large data handling is required, Framework is fully compatible with dBASE II®.

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Spreadsheets are simple to create, use traditional row/column or English-language cell addresses, can be linked to automatically update other files based on cell data and have an exclusive international numerics feature that will change entries to accurately reflect changes in currency denominations including the placement of commas and decimal points.

Graphics

The graphics portion of Framework has been designed to produce exceptional charts and graphs on standard monochrome monitors. Six of the most frequently used business graphs are built-in and can be automatically drawn and updated from data in spreadsheets and database files.

DOS Access

The new DOS access capability allows any user to actually run other PCDOS software inside Framework. This allows users to gather data from other programs without quitting Framework. It will be of great help to people who frequently shuttle between programs and to businesses who perform frequent interchange of programs or data with larger systems.

Custom Applications

Framework comes complete with its own programming language. Users can begin writing their own custom packages or use software developers right away. In addition, dealers will continue to receive the excellent support that has helped make Ashton-Tate the front-runner in the software industry with dBASE II and FRIDAY!

Hardware

Framework will run on the IBM PC, PC XT and all compatibles. It requires just 256K RAM and dual 360Kb floppy disk drives with monochrome display.

Availability

Framework will be available in Australia from the end of July. Contact your dealer end-June for more details or write to the Master Distributor, ARCOM Pacific, Freepost 2 (no stamp required), P.O. Box 13, Clayfield, Qld. 4011.

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stored in ROM and the built-in 300-baud modem provide an easy method of connecting the Portable to larger systems via telephone lines. If a faster modem is used, the user must select the 'Terminal Config' menu option and update the 300-baud rate that exists as a default. Baud rates between 300 and 19200 are possible. The configuration program also allows the user to select other conditions such as whether parity checking should be carried out, whether the end-of-line (EOL) signal is a carriage return or a line feed, and whether data handshaking should be on or off.

I was unable to work with Basic on the Portable because the review machine was not supplied with it. The Vanilla Microsoft Basic is now available for the Portable and an advanced version is being readied. IBM's BasicA, to nobody's great surprise will not run on the Portable.

Conclusions

There were some software problems that on two occasions caused the A:drive — with all the applications stored in RAM —to be overwritten. The only way out was to reformat the disk and load new copies of everything. After the second occasion, however, there were no problems.

Despite this, it was easy to work with the Portable. Its use of function keys helps the new user to start work immediately, and the processing power of the machine makes Lotus 1-2-3 and the like look even better than they do on the IBM generation of systems.

The $2995 price tag is a little expensive for a portable computer, but when you consider what you're getting for the money it doesn't seem too bad — over half-a-megabyte of memory including the bundled-in software, the ability to link up to an IBM-type system and use its resources, plus true portability.

More than anything, the Portable is a clear statement by Hewlett-Packard that it intends to get a piece of the personal computer business action. We did not perceive the earlier HP 150 to be a particularly great advance for the company, nor for the computer industry.

The Portable, on the other hand, looks as though it will not only carve out a niche for itself, but will have its own imitators.

It was not possible to run Benchmarks on the Portable as Basic was not supplied with the review machine.

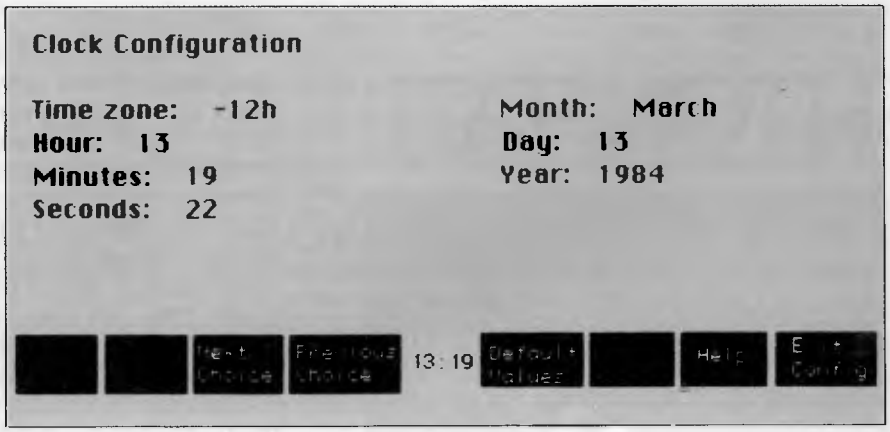

Fig 1 Function key f3: clock configuration

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IBM's SECRET

NEW PCs: The Yankee Group reveals all . .

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Price: $4000 — 24000
2 or more 80286s may be
2.5 Megabyte
80 Mb Hard disk
IBM operating system (VM-style as a guest system to MS-DOS)
CP/M, UNIX etc.

The VM-like

operating system codenamed "Glass"

The Big Blues Brothers report; long nights glueing telexes and memos together out of rubbish bins in an alley-way behind IBM headquarters in Sydney, followed by a steamy stakeout in a North Sydney health studio. Life isn't easy. But the determined Yankee Group met their deadlines and down-loaded their report to APC's editorial offices from a Red Phone in a Bondi Beach fish and chip shop using a NEC portable and a Randata acoustic coupler.
From the right: Senior Yankee Group researchers, Graham Phillipson and William Maudlin. On the left, an APC Press investigator, who wishes to retain his cover for further APC in-depth shock-horror computer industry reports.

IBM's Secret PCs

By Graham Phillipson and William Maudlin

APC commissioned the high-powered Australian technology surveillance team, The Yankee Group, to investigate IBM's new PC. Not one, but three products, they report, based on the speedy new Intel 80286 chip. You'll see a new PC, a multiuser system and a new operating system announced in September in the US, also they say The Yankee Group believes that IBM is also preparing to introduce a line of integrated office systems similar to Symphony and Framework. These packages will include IBM's end-user data management facility QBE (Query-By-Example), and should be available by the second quarter of 1985. Pricing for these products will be very competitive, and they are certain to affect the integrated software market in the same manner that IBM's recently announced text processing packages affected the standalone word processing software market.

Intel's 80286

Intel's 80286 contains all the features of the 80186 along with virtual memory and a few other surprises. In terms of performance, the 186 is twice as fast as the 8086 and the 286 is six times faster than the 8086. Moreover, the 80286 is approximately three times faster than the Motorola MC 68000 (its nearest competitor) when both chips run at the same speed. Compared with the 8088, the 80286 can process data six times faster. The 80286 can address 16Mb compared to the 8088's limit of 1Mb limit.

IBM's 80286 based PC

The Yankee Group believes that IBM, will announce an 80286 in August or September, which will be available in 1985. The first application will be in the role of a high-end single user workstation. Second will be a multi-user workstation, and the third a high-level operating system which will allow other operating systems such as PC-DOS and UNIX to run as "Guests".

The PC will take advantage of the 80286 multi-tasking capacities to run a variety of multi-tasking, multi-user operating systems such as some form of AT & T's UNIX, Microsoft's Xenix, along with Microsoft's unannounced MS-DOS 3.0 and 4.0 (multi-tasking and multi-user operating systems) and Digital Research's Concurrent PC-DOS. But even more importantly, the IBM 286 PC will offer an IBM developed operating system that looks and acts like a stripped-down VM (virtual machine, one of IBM's main-frame-mini operating systems) PC-DOS, UNIX, and other operating systems will all run " under" this IBM OS as a "Guest", and present applications will be able to run with little or no modification. But they will not be able to take advantage of the new machine's performance and functional enhancements; new high resolution graphics, higher speeds, internal windowing, multi-tasking, etc until they are "ported" over to the new operating system.

While a single-user workstation with this much power will be more powerful than most users will need, IBM plans two other roles for this new system. One of these roles will be a multi-user system for small business or at the departmental level in large corporations. Finally the 80286 based machine will serve as an intelligent file server. The Yankee Group anticipates that one version of the machine will have at least two 80286's with over 2 Mb of main memory and an 80 Mb disk. Not only will the intelligent file server handle the conventional duties of current file servers (sharing peripherals such as disk-drives and printers), but this advanced PC will also have these four powers: One, control the network, probably with Microsoft's networking software, MS-Net; second, it will offer the capability to download applications software to networked PCs; three, it will contain electronic mail and security features; and four, will provide a centralised database for the networks users.

IBM will position the low-end of the new line so that its price and functionality are roughly equivalent to the high end of the PC family. This will allow room for the PC family to coexist with it for a short period of time, before the PCjr family grows up, and the 80286 family comes down (in price) to provide a smooth path from diskless PCs to sophisticated multi-user, multi-tasking networked systems.

IBM studied the production process of the PC family, and some of the conclusions from that effort went into the production of the PCjr. The chip count in the PCjr is lower than the PC, and other elements of the system are comparatively less costly to manufacture. IBM has since learned even more from the production of the PCjr, and it is now ready to employ its knowledge.

The Yankee Group believes that IBM will blend elements of the PC and PCjr products with the resulting system providing:

* Cheaper products
* Low cost. IBM doesn't have to try — as do its competitors — to make its money on the sale of each box. The money rolls in as software sales and eventual system sales are made.
* More sophisticated graphics.
* A wide range of memory and storage. Entry systems will consist of 128k with one diskette ("disk-less" systems for networked business environments will also be available). The line will top out at 1 Mb, two diskettes, a hard disk and tape back up.
* A wide range of keyboards, Keyboards (REAL keyboards!) will be available for: home use (both adult and child versions) educational environments, business people, data entry, etc.

In support of this promise, look to IBM's latest enhancements of the PCjr family:

* A 256k machine now costs only $US1,300
* Memory can be increased to 512k.
* A free replacement keyboard that can be connected with a cable.
* Operating system revisions to enable better management of the increased system resources and iron out initial operating system bugs.

All of these point to the enhanced PCjr assuming many of the roles previously dominated by the PC family. The PC family, as it exists today, will be delicately phased out over the next two quarters — with fourth quarter price cuts signalling its final "stabilisation".

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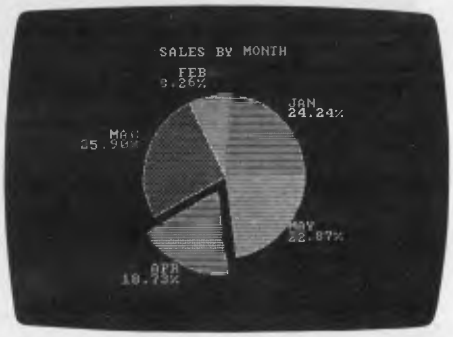

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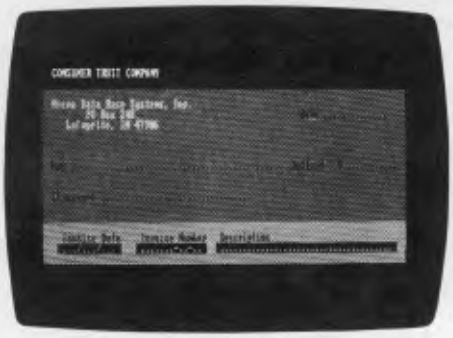

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Jane vs Appleworks

The Apple II must combat stiff opposition if it's to survive, and the key to survival is software. Jerry Sanders takes an exclusive look at Apple's Appleworks and Arktronics Corporation's Jane, the latest in integrated software for the Apple II.

When Apple announced Appleworks, it became clear that a battle was on to provide a standard integrated software environment for Apple II users. The other contender is Jane, from the Arktronics Corporation. With Jane at US$179 (mouse included) and Appleworks at $295, it seemed on the face of it an interesting contest.

After looking at both products I can say that there's no contest, but this isn't because one of the packages beats the other hands down: it's that the two are totally different in design, capability and user interface.

ProDOS vs DOS

An important difference is that as Jane runs under Apple DOS, it will work on any Apple II product, be it II plus, IIe or IIc. Appleworks, on the other hand, is one of the very first applications under Apple's ProDOS operating system which the II plus can't cope with at the moment. ProDOS is a subset of the Apple III operating system SOS, and supports hierarchical structures for disk directories and a Pascal-style Filer for managing them. ProDOS utilities, such as creating a subdirectory or formatting a disk, are available within Appleworks from a utilities menu. Appleworks is implemented under SOS on the Apple III under the name III E-Z Pieces (pronounced 'easy pieces').

Ancient vs modern

Jane and Appleworks are combination products, each including a database spreadsheet and word processor application. In each case the three modules share a common user interface — the tools available to communicate with the programs. This is one of the most important advantages of the new integrated software products, since the sharing of command and menu structures by three or more applications gives the user the opportunity to learn all three with only one set of instructions. Both programs use the 'desktop' concept, but interpret it differently. In Appleworks, all the files you want to use have to be in RAM first — the disks are used only for storage, not as virtual memory. Switching between files is quicker this way but demands a lot of RAM. Jane uses virtual memory techniques. Although files may have a window up on the screen, the data you can't see is waiting on the disk to be called in as you scroll through the file.

'After looking at both products I can say that there's no contest, but this isn't because one of the packages beats the other hands down: it's that the two are totally different in design, capability and user interface.'

The key difference, however, is in the user interface. Appleworks is menu driven, and the nearest you get to screen graphics is the depiction of sub-menus as file cards on the screen. Jane is all mice and windows, and the mouse and mouse card are both included in the price. Apple has no plans to introduce the mouse, icons or any other frippery until 1985, and quite possibly won't bother.

The question of whether mice are a gimmick or a godsend has been teasing the software industry for a while now, but a decision may soon be made. Ashton Tate's jury recently brought in a 'not mouse' verdict for its integrated package Framework, arguing that good onscreen documentation and a single interface point are the sensible solution. Apple agrees, so control key sequences are used in Appleworks and full documentation of those sequences is always available by refreshing the screen during an application.

Jane's mouse is of the single button variety which I consider to be the only kind worth having — any more and you might just as well be back at the keyboard. It also has three gears to dictate how far the screen icon moves for each twitch of the mouse on the desktop. In slow gear ('first'), the ratio is 1:1, and in fast ('third') 2:1; second (normal) lies somewhere inbetween. The higher the gear the smaller the desk area needed by the mouse, but accurate positioning is quite a skill in top gear.

Unfortunately the icon's movement on screen is fairly jerky, and on top of that the mouse doesn't circulate too well on a shiny surface.

Both programs come on four disks. Jane boots up directly from the system disk once the mouse car has been plugged into slot four. A yellow help disk contains animated displays to demonstrate all Jane's features; when required, a screen prompt tells you to 'INSERT THE YELLOW DISK'. A third disk contains demonstration data; the fourth was originally the demo disk sent out with press releases and has now been renamed 'learning disk'. It's a rolling animated sequence — the only interaction the user gets is pressing any key to pause the 'silent movie'.

The advance copy of Appleworks supplied for this review came on four disks, the first of which is a system disk used to boot up a subset of ProDOS, including those utilities such as disk format which are available from within Appleworks.

COMPUTERS TODAY

"Ask not what your printer can do but only what it can do for you"

New Japanese Proverb.

The razzle-dazzle and the hype continues. Computer salesmen fall over each other trying to sell you the latest, very expensive add-ons ... those elaborate bits 'n' pieces that will convert your humble desktop computer into an electronic marvel.

That's nice if what you need is a racehorse. But what happens if what you really need is a workhorse? The computer tasks in your office may be quite specific and unlikely to change. A damn good workhorse add-on may be all that is required.

A printer, for example, is likely to be the very first addition to your desktop computer.

But here's the problem. A printer can cost you from $1,000 to $5,000. How then do you choose the one you need? If you're wise, you choose your printer for what *you do* and not for what *it does*.

THE TOSHIBA P 1340 – THE PRINTER WORKHORSE.

The new Toshiba P 1340 starts with the distinction of being the only printer that has been specifically designed for the personal or desktop computer.

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SPEED – HOW ESSENTIAL?

Everything in life is a compromise of sorts. If you want brilliant type resolution then you're going to have to sacrifice speed.

The very best type resolution only gives you 13 characters per second. By printer standards that's pretty slow, about the speed of a competent typist. The P 1340 gives you 54 characters per second for letter quality printing and 144 characters per second for internal memo or normal office print-out material. You can get a more expensive printer that does it twice as fast but you sacrifice clarity. The general rule is that speed costs you clarity. The P 1340 is thought to be the perfect compromise.

WHERE THE P 1340 SHINES.

Many computer sales outlets privately conclude that the Toshiba P 1340 is destined to be the premier dot matrix printer for personal computers.

It is, after all, the perfect compromise between clarity and speed at an attractive price.

The Toshiba P 1340 is ideally suited for word processing as it has a clarity that rivals a daisy wheel printer but is up to 75% faster. It comes with Qume SPRINT 5 emulation, standard friction feed and true proportional spacing for letters.

It is also ideal for data processing and has a built-in pin feed tractor for continuous forms. It handles papers from 11.2 cm to 25.4 cm wide.

P 1340 – PART OF THE TOSHIBA PRINTER FAMILY.

Toshiba have three printers – the P 1340, P 1350 and P 1351. The other two have more sophisticated applications and therefore a bigger price tag.

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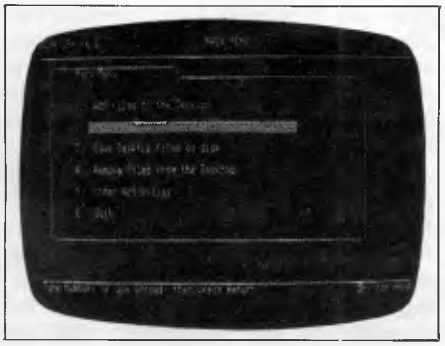
Disk two is the program disk proper, disk three demonstration data. Number four is a (double-sided) programmed training disk (PTD) and has all the graphics 'missing' from the applications!

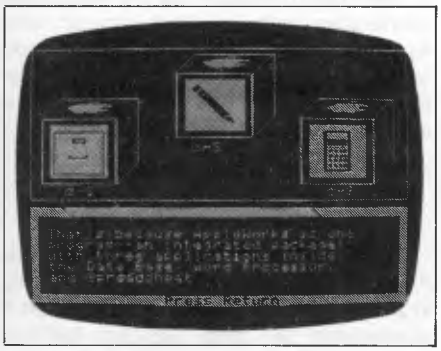
This disk deserves a paragraph to itself. Not only are the graphics superb, but unlike Jane's so-called learning disk, the Appleworks PTD is fully interactive with question and answer tests and a helpful response to wrong answers. A disk like this from a third party would cost anything between $75 and $150.

Documentation for Appleworks wasn't available at the time of this review, but the training disk was an adequate substitute in conjunction with the help screens.

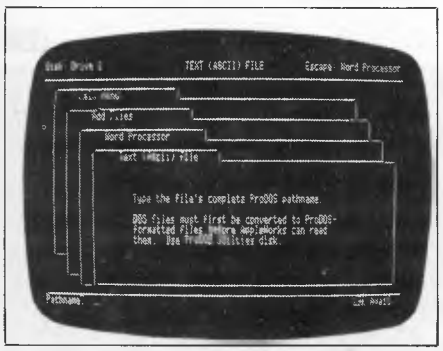
To use Appleworks you need a IIe 80-column card, which adds an extra $165 if you don't already have one. On an unexpanded Apple II this leaves a minimal 10k for working files, so if you plan to make extensive use of Appleworks for large documents or databases the extended 80-column card at around $389 is a better bet, since this adds another 64k of RAM.



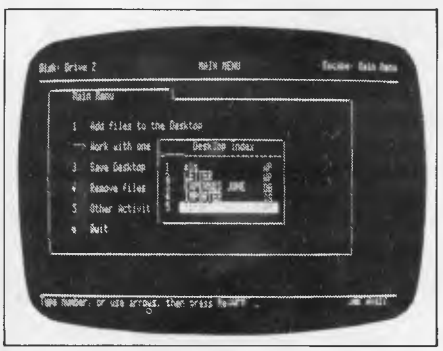
Appleworks main menu



Training disk: good graphics



Layered menu structure



Your desktop at a glance

User interface

Jane boots up from one disk straight into a row of 13 icons along the top of the screen. Everything happens through the icons via the mouse, so no keyboard overlays or function keys are needed. Control key sequences are an option documented in the handbook.

Jane's icons divide into two groups. The first five icons are 'tools' and the mouse cursor becomes whichever one is active. Before you get down to work, or at any other time, an icon which looks like a computer leads to a terminal parameter menu where you select noise on/off, text size and mouse speed. From the same menu select printer driver, print quality, size and paper type (fanfold or sheet). All these commands, in common with the rest of Jane, are executed by a single click of the mouse with the cursor icon over the option required.

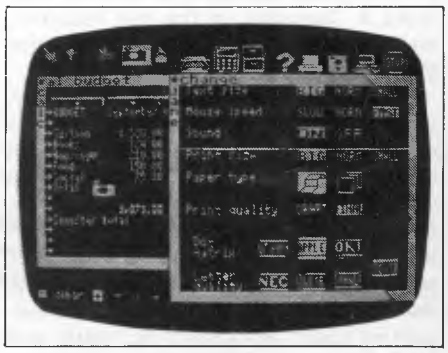
Appleworks' interface is solidly traditional. In most cases the cursor selects and the return key executes. Escape takes you out of the current menu one step backwards towards the main menu. The only concession to graphics is that all the available menu options are visible on the screen at all times as file card images so you know, for example, how many presses of the escape key will get you to the one you want.

Windows

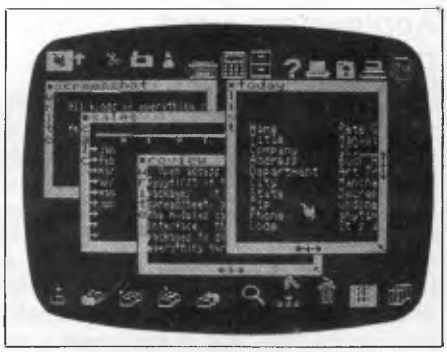
Jane wins here because Appleworks doesn't have proper windows. The one concession — a sensible one — is that a window on a spreadsheet can be opened, so the user can see two groups of cells on the screen at once from different parts of a large sheet. Jane can cope with up to four active windows at once and it manages them slowly but efficiently. Users of Microsoft Windows will no doubt find the pace snail-like and notice that window size management is unintelligent, but otherwise window management is excellent. An applications window can take on any size or shape (as long as it's four-sided). A programming bug allows the user to enlarge the window so much it obliterates the icons at the bottom of the screen.

This set of icons changes according to the application currently in use (that is, on the top of the pile), so in word processing mode (Janewrite) typeface options and formatting icons appear, to be replaced by mathematical functions in Janecalc or sort and search options in Janelist.

Jane: change disks for help



Easy options by mouse



Up to four applications windows

80 col wordprocessing (with eyestrain)

Word processing

Jane's word processing screen displays three sizes of character as well as bold, sub/superscript and underline. Using the smallest text size gives a maximum 62 column by 16 row window for text entry and the likelihood of eyestrain. Large characters reduce the window to 40 x 16. At any time, block moves and copies make use of disk buffering (Appleworks uses a RAM based 'clipboard' so Jane can deal with larger blocks). Both Jane's buffer and Appleworks' clipboard contain the most recent paste-up, which can be re-used for further copying until overwritten with a new paste-up. Jane's camera icon takes a 'snapshot' of the text required, and this icon is swapped for a gluepot for sticking the text in its new location.

'Find' operates in 'instring' mode only, so if the word you want is part of a larger word you'll hit the larger word too. No global find and replace is implemented on Jane. Useful information like page, column or row number isn't provided on screen (it is in Appleworks). Automatic pagination does occur on printing. Janewrite has six printer drivers available for Epson, Apple and Oki matrix, and NEC, Qume and Diablo daisy printers.

Appleworks word processing

Janewrite puts up the typestyle on the screen, but Appleworks indicates a selection by flagging the start and finish of a block with a circumflex accent. You might forget what a particular circumflex stands for, but by putting the cursor on it the chosen parameter can be read at the bottom of the screen. With Jane, help is obtained by the user substituting a help disk for the data disk; in Appleworks, all help is immediately available on screen using the apple/question mark key combination. The same applies to the document format menu, which is clear and comprehensive despite packing in no less than 40 options (Fig 1). An Appleworks stylesheet is easy to set up and save on disk. To use it (for reproducing the same style of document consistently and without effort) choose the saved sheet as the active document, rename it to avoid losing the original, and type away. Simple, effective and a joy to use.

Appleworks allows up to three printer drivers to be online, and provides for Apple, Epson and Qume Sprint models (ten in all), plus an eleventh option for customising to one not named.

Integration

Apart from the advantage of using a single interface for three products, integrated packages offer the ability to include spreadsheet or database output in word processing documents. Jane's operation is more transparent than Appleworks' in this respect, since all the user does is take a snapshot from a spreadsheet window and glue it into the document. With Appleworks, the same operations are available but the user is told that what he is doing is making an ASCII copy of the block, printing it to the clipboard, and copying from the clipboard to the document. Jane probably has the right idea: drivers don't really want or need to know what's happening to the carburettor when they push in the choke. Where Appleworks scores is in being able to handle input from DIF and QuickFile files to its applications files as well as ASCII, and write out to all three formats. Jane can communicate only with itself.

'Appleworks is a serious business proposition which must compete with such heavyweights as Open Access and Framework running on 16-bit machines . . . '

Conclusion

The limitations of Jane's word processor apply generally to its database and spreadsheet, which are both less powerful and have less flexibility than their Appleworks counterparts. When I started using Jane, I had the feeling I was using a package that was indistinguishable from the real thing. After using Appleworks, this impression was confirmed. Jane does everything the user-friendly bible commands, but so slowly it must be disqualified from serious business use. In fairness, it must be said that Jane is marketed as a beginners package and there's nothing on the market for the Apple II at the moment to compete with it. However, it's not a serious competitor to Appleworks.

Appleworks is a serious business proposition which must compete with such heavyweights as Open Access and Framework running on 16-bit machines. Any Apple II user who has been preparing to go for a 16-bit machine to get the benefits of the integrated package philosophy now has a real alternative.

The Apple II already has the most comprehensive software base around, and Appleworks is a genuinely good reason to hang on another year or so before buying a more powerful computer — a lot can happen in hardware in a year.

Note that the price quoted for Appleworks excludes sales tax and that, at present, no Australian price has been announced for Jane. Contact Ashtron Software in Gosford on (043) 28 3555 for more details.

END

	Appleworks	Jane
Page width	YES	NO
Left Margin	YES	YES
Right Margin	YES	YES
Chars per inch	YES	NO
Proportional spacing	YES	NO
Indent	YES	NO
Justify/unjustify	YES	YES
Centre	YES	YES
Paper length	YES	YES
Paper type	YES	YES
Top margin	YES	YES
Bottom margin	YES	YES
Lines per inch	YES	NO
Double/triple spacing	YES	YES
Force new page	YES	NO
Protect paragraph/group	YES	NO
Page headers/footers	YES	NO
Skip lines	YES	NO
Page number automatic	YES	YES
Pause here	YES	NO
Marker set	YES	NO
Bold/super/sub/underline	YES	YES
Force page number	YES	NO

Comparison of Jane & Appleworks print options

d foreign language. 2 or 3

```
.list files
   DATABASE  FILES  NBRRCDS  LAST UPDATE
    HOMES    DBF     1005     11/01/83
.use homes
.list homes selling for<50000
*** SYNTAX ERROR *** RE-ENTER
.list structure
   FLD   NAME      TYPE   WIDTH   DEC
   001   ADDRESS   C      025
   002   SELLPRICE N      009     002
   003   AGENT     C      025
.list for sellprice<50000
```

R language.

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TEACH YOURSELF LISP

Dick Pountain continues his 'Teach Yourself' series by explaining how basic list manipulation is performed; so it's hands-on and ready to go.

This is part two of *APC's* Teach Yourself Lisp series. Copies of part one, which commenced in August 1984, are available through Back issues.

A product for those following Dick Pountain's Teach Yourself Lisp series: Microsoft has released a version of the language for MS-DOS and CP/M-80 computers.

The package, called the muLisp-82 Artificial Intelligence Development System will work on a range of machines including the Apple and IBM PC.

It can cope, says Microsoft, with the bigger (segmented) memory systems of the 8088 or 8086 family of microchips — something a bit beneath one or two Lisp compilers which can restrict memory artificially.

As well as two educational programs, the package also includes an implementation of the original Eliza or Doctor program, written by Joseph Weizenbaum of the Massachusetts Institute of Technology — the program which always ducked any attempt to ask it a question by turning the question into another. ('Who are you?' — 'Why do you want to know who I am?').

If you can't find a store selling it, contact Microsoft on (02) 450 2522.

In the first part of this series we took a look at the concept of a list and list processing. We concluded that most programming languages could not handle lists effectively because they concern themselves solely with the lower level objects, characters and strings. We also saw a notation for representing lists and three simple operations to perform on them.

The Lisp language (the name itself stands for LISt Processing) is devoted to the manipulation of lists. This doesn't mean that it is not a general purpose programming language, though, for as we shall see the list is a data structure that can be used to represent virtually anything you might want.

Behaviour

Having procrastinated so far, let's dive right in at the deep end and see how an actual Lisp interpreter behaves. The stuff we'll be doing is so simple that the difference between versions of Lisp won't show up yet; when it does I shall discuss them in more detail. I'm going to assume that you have at least a rudimentary experience of Basic, and that you have a computer running one of the Lisps mentioned in last month's 'Newsprint' on page five.

Lisp is an interpreted language like Basic (though some mainframe versions can compile too); when the interpreter is loaded it sits there showing its prompt sign and waiting for you to give it something to do.

If we enter a number, say, 2, Lisp replies with 2. Basic would have taken the 2 as a line number and waited for us to input the statements that make up the line. Lisp behaves quite differently; it *evaluates* what we enter at the prompt. The value of 2 is simply 2.

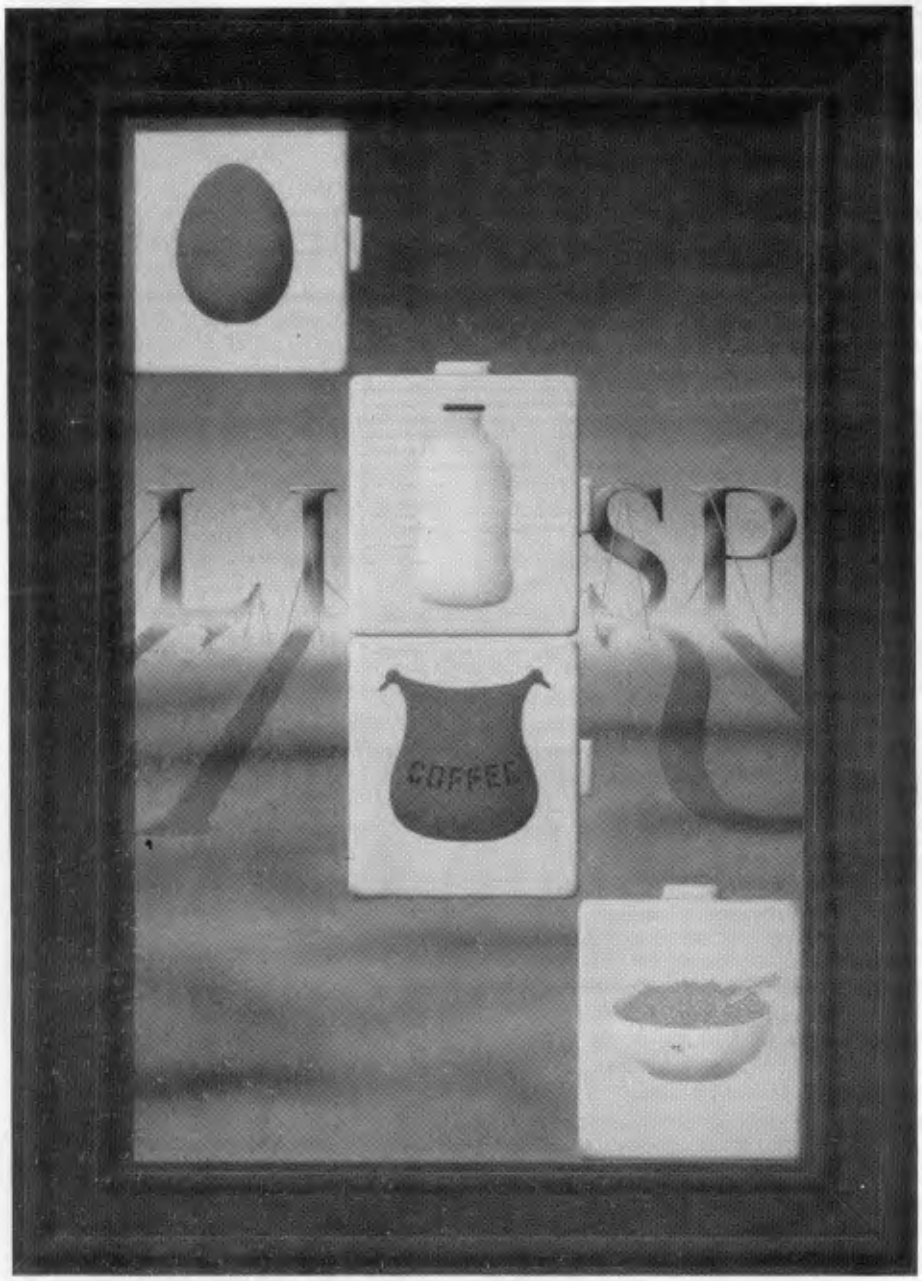
If we enter a word, say 'FRED', Lisp will come back with 'UNDEFINED' or some equivalent message: it tried to evaluate FRED and discovered that it doesn't know a value for FRED. Basic would have created a new variable called FRED and returned us its automatic initial value of 0. Lisp only gives values to names (or 'identifiers') like FRED if we explicitly tell it to. What's more the values they can take are not limited to numbers; FRED could just as well have the value 2 or THOMAS or the list (EGGS MILK SUGAR).

If we enter a list (1 2 3) then Lisp gets quite upset and responds with a message to the effect that it has been given an UNDEFINED FUNCTION.

If we enter (PLUS 2 3) Lisp will reply with 5. (PLUS 2 3) is a list whose first item is a name, but in this case the name happens to be that of a *function* which Lisp already knows; it adds up the rest of the items in the list and gives us their sum.

We now have quite a lot of evidence about how the Lisp interpreter behaves:

a) The interpreter's behaviour is simpler than that of Basic. It merely tries to evaluate anything entered.
b) The things we can enter are numbers, names and lists.
c) The value of a number is itself.
d) The value of a name is what we give it. Lisp doesn't automatically give it any value.
e) If we enter a list, Lisp assumes that its first item is the name of a function, and it then applies the function to the rest of the list.
f) Lisp uses *prefix* notation for arithmetic (and in fact for all its functions); the name of the function comes *before* its arguments. Instead of 2+3, we say



PLUS 2 3. This is the exact opposite of Reverse Polish, as used by Hewlett Packard calculators or Forth.

Numbers and names in Lisp are called 'atoms' to distinguish them from lists. 2 and FRED are atoms, while (2), (FRED) and (2 FRED EGGS) are all lists. () is an empty list with nothing in it. (2 FRED (A B C)) is a list with a list (A B C) as one of its elements; lists do not have to define new functions next month.

Functions in Lisp behave in the strict mathematical fashion, that is they *always* return exactly *one* value. It's worth imprinting this on your brain, because the word 'function' is often used in a much sloppier sense in programming. The value of a function is printed on the screen if you type it directly at the keyboard, but inside a program it will return its value to the function which called it.

Let's try an example. The function SETQ is already defined in Lisp and it does roughly the same thing as = in Basic. So:

(SETQ FRED 12)

makes 12 the value of FRED. When you type this expression, Lisp replies 12. The value returned by SETQ is always the value of its second argument. It so happens that we only executed SETQ in order to put a value into FRED, but it returned us the value 12 anyway. In Basic the statement FRED=12 has a similar *effect*, but the *statement* itself doesn't return a value. If we type FRED, both Basic and Lisp will now reply 12.

Now try:

(SETQ FRED (PLUS 2 3))

This returns the value 5 and sets the value of FRED to 5. Why is FRED set to 5 and not to (PLUS 2 3)? The second element of the list which begins with SETQ is the list (PLUS 2 3), and so this is the second argument to SETQ. But what has happened is that Lisp has *evaluated* the argument. The value of (PLUS 2 3) is 5 as we saw earlier, and this value was returned to SETQ, which both returns it to us on the screen and puts it into FRED.

It's essential in Lisp to know how a function treats its arguments, and this information will always be given in the glossary of functions that is supplied in your manual. SETQ in fact evaluates its second argument but not its first. If you think about it, that is exactly what is required here, as we are changing the value of FRED, and we are not at all interested in what FRED's value happened to be before we changed it. Most Lisp functions evaluate *all* their arguments so SETQ is rather untypical.

Now consider:

(SETQ FRED (1 2 3))

Here we are attempting to make the value of FRED the list (1 2 3). In fact we bomb out with an UNDEFINED FUNCTION message because Lisp tries to evaluate the list, without success (because 1 isn't a function). What we need is a way to tell Lisp not to evaluate (1 2 3) but take it just as it is. The function QUOTE, which in most Lisp systems can be abbreviated to ', does just that.

Trying:

(SETQ FRED '(1 2 3))

achieves what we want. When we type FRED now, the answer comes back (1 2 3). To reinforce the lesson, typing 'FRED results in FRED; Lisp didn't try to evaluate FRED but just gave us its name back.

Now let's try:

(SETQ FRED 'THOMAS)

This makes THOMAS the value of FRED; unlike Basic, Pascal and similar languages there are no 'types' of variable in Lisp. A name (which is the equivalent of a variable) can have any expression as its value, whether a number, a string or a list. Furthermore the value of a name could itself have a value, and so on:

(SETQ THOMAS 'JASPER)
(SETQ FRED THOMAS)

'Writing a program in Lisp consists entirely of defining new functions in terms of pre-existing ones. In this sense Lisp is an extensible language, like Forth, but unlike Basic.'

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leaves JASPER as the value of FRED, because a ', THOMAS gets evaluated in the second expression.

It's quite important to get this notion of evaluation clear in your mind. When we get on to defining our own functions further on in the series, keeping track of the values that are produced will play the same role that mentally or manually tracing execution does in debugging a Basic program.

Functions

Now is the time to look at the three most important functions in Lisp. They come with the highly unhelpful names of CAR, CDR and CONS and they correspond more or less to the three functions 'first', 'rest' and 'construct' identified last month. The odd names of CAR and CDR (pronounce it 'cudder') are derived from the mnemonics of machine instructions on the venerable IBM mainframe upon which Lisp was first implemented back in the sixties. It might have done wonders for the popularity of Lisp had more sensible names been adopted, as they were for Logo. Because Lisp is extensible, I could easily redefine CAR and CDR as FIRST and REST but that would be to put me out of step with all the textbooks and manuals.

CAR returns as its value the first element of its single argument, which must be a list. So:

(CAR '(EGGS MILK BACON))

returns the atom EGGS.

CDR returns a list consisting of all but the first element of its list argument, so:

(CDR '(EGGS MILK BACON))

is (MILK BACON) and :

(CDR '(MILK))

is (), the empty list. Applying either CAR or CDR to an atom or the empty list gives an error.

CONS is the main list building function. It takes any expression (not necessarily an atom) and a list and returns a new list with the expression as its first element, so:

CONS 'PIGS '(EGGS MILK BACON))

returns (PIGS EGGS MILK BACON), while:

(CONS '(PIGS DOGS) '(EGGS MILK BACON))

returns ((PIGS DOGS) EGGS MILK BACON). In other words CONS exactly reverses the action of CAR.

You've maybe noticed the careful use of 'a list' or 'a new list' in the above descriptions. CAR, CDR and CONS do *not* alter the lists they are given as arguments. For example, were FRED to be given the value (EGGS MILK BACON), then (CAR FRED) would return EGGS but leave the value of FRED quite unaltered. It's characteristic of the majority of Lisp functions that they merely return a value without altering their arguments. SETQ is thus doubly atypical as one of those functions that does change the value of its argument; Lisp people say that it has a 'side effect' (in fact it's used only for its side effect).

Familiarisation

It's quite difficult for us Basic-weaned programmers to come to terms with this style of programming; in Basic most programs work by altering the values of variables. A good lisp program uses the values produced by functions 'on the fly', storing them, if at all, only locally and temporarily. SETQ is used far less often than = is in the equivalent Basic program ('Lisp means never having to say X=X+1 . . .').

'Functions in Lisp behave in the strict mathematical fashion, that is they always return exactly one value.'

Once you do master it, the functional style has great advantages; without side effects the most common source of bugs is removed at a stroke, as each function can be guaranteed not to interact unexpectedly with others. This in turn allows you to modify a function deep down inside a nested set of definitions, in the confidence that none of the outer levels will need to be altered.

Practice

But enough of the philosophical prattle. Let's try out some list-bashing with CAR, CDR and CONS. To get the second element of a list, use:

(CAR (CDR '(TOM DICK HARRY)))

Most Lisp systems have this operation already defined as CADR, often accompanied by the outlandish CADDR, CAADDR and CADADR, whose meanings I'll leave to you to work out.

To get the list (TOM HARRY) out of this list — that is, to get rid of DICK, try:

(CONS (CAR '(TOM DICK HARRY)) (CDR (CDR '(TOM DICK HARRY))))

Notice that we have to build a new list with CONS because CAR and CDR do not alter the original list. This is a construction you will use over and again in Lisp programs. I suggest that you trace through this example and try some others until you are quite familiar with the way it works.

At this point some of you may be going into shock and wondering what it's all for. Well, just think of (TOM DICK HARRY) being replaced by the text of *War and Peace* and you may start to see some applications. But surely, if we want to extract the 24,567th word from *War and Peace* we won't have to use a string of 24,567 CARs and their associated brackets? The answer is obviously, no, we won't. We'll use some form of repetition as in any other programming language. It probably won't be an actual loop, but rather a function that says: 'Is the CAR the word I'm looking for? If not apply me again to the CDR.'

But that is to get ahead of ourselves.

One very pertinent question that you might have is: 'Why doesn't Lisp have a random access function that can get the Nth element of a list directly?'. To answer that fully we'd have to go into the physical way that Lisp stores data.

The whole design of Lisp is intended to make it reasonably efficient on existing computers, and that means using linked lists which can only be accessed from one end, hence CAR and CDR. Even using linked lists, Lisp requires more processing power than conventional languages; in the future, with new generations of processor, list processing languages will probably have such a random access structure.

Next month we'll find out how to define new functions and so, at last, write some proper Lisp programs.

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Flag setting on logic instructions

Mario Gianota explains the purpose of AND, ORA and EOR logic instructions in assembler language with the aid of a 'guessing game' program. Although written for the Commodore 64, it is easily adaptable to a wide range of micros.

How good a communicator would you be if your vocabulary only consisted of two words? At electronic level that's the only language computers understand. What they can do that we can't is to string these two words together and recognise them at very high speeds.

It's usual to describe a binary (two-state) system in terms of switches being on and off. At electronic level, though, it's not language but voltage that counts, and logic chips contain circuits which react to, or deliver, one of two possible voltage levels. Logic 1, known as 'high' actually means that the voltage present in that part of the circuit is somewhere between +2.8 and +5 volts, while Logic 0 or 'low' corresponds to a voltage between 0 and 0.8 volts. Thus, high and low voltage are the electronic equivalent of on and off or yes and no in human language.

Logic gates

The circuits printed on micro chips consist largely of logic gates, which are essentially switches with one or more inputs and a single output. They have names such as AND, OR and EOR (pronounced Eyore, as in *Winnie the Pooh*).

Instructions with similar names pop up in assembler language and, like the gates, act on input data and produce an output.

One of the most difficult leaps the assembler language learner has to make is understanding how these logic instructions work. The object of the program presented here is to show how the assembler instructions AND, ORA and EOR work and for what input combinations the zero and carry flags in the processor status word are set.

Flags

Those of you who've been following our Teach Yourself Assembler series will be familiar by now with flags. These are sections of a processor's memory which indicate whether any or all of a number of predetermined conditions have arisen during the execution of instructions by the processor. For example, if the result of an arithmetic operation is zero, then the zero flag will be set (in most processors this means it will be 1 rather than 0). If the result of an arithmetic operation produces a carry, the carry flag will be set. Equally, a program can look up the state of a flag and branch to its next instruction depending on the result.

The program here is in the form of a guessing game with points awarded for a correct answer and double or triple points awarded for guesses written in hexadecimal or binary notation.

Program breakdown

Lines 10-90 are the main command lines which initialise the variables then GOSUBs the middle of the program, waiting for a keypress before looping back to the middle again. It is therefore a Q-shaped program with a beginning and a middle but no end. The beginning is visited once — the tail of the Q — then the program is a loop.

The beginning runs 30 000 to 30 990. It sets up HX$ for use in translating hexadecimal numbers. A random function is set up to produce questions. The score PNTS for points is set to zero. A title string is set up to show which columns on the screen are binary, hexadecimal, decimal, negative flag and carry flag. Then the three cases are set up in a small array of $ (2). The OP stands for OPERATION. Case 0 is AND, case 1 is ORA (OR the accumulator with the memory) and case 2 is EOR (exclusive −OR the accumulator with the memory). At the end of the beginning the screen is cleared. The program returns to the main line.

The main line sends the program to the MIDDLE at 20 000 — 20 990.

The MIDDLE does six jobs:

(1) It picks one of the OPERATIONS — AND, ORA or EOR.

(2) It picks a number to go in the accumulator register.

(3) It picks a number to stand as the contents of a memory location.

(4) It accepts a guess from the user as to the contents of the accumulator after the operation has been completed. It translates the guess from binary or hexadecimal back into decimal.

(5) The operation is performed and the flags are set.

(6) The player's guess is checked against the result of the operation.

The user should run the program and put '%' in front of a binary guess, and '$' in front of a hexadecimal guess. Since binary is the way to understand these operations, binary guesses which are correct are rewarded more than the other two kinds of guess.

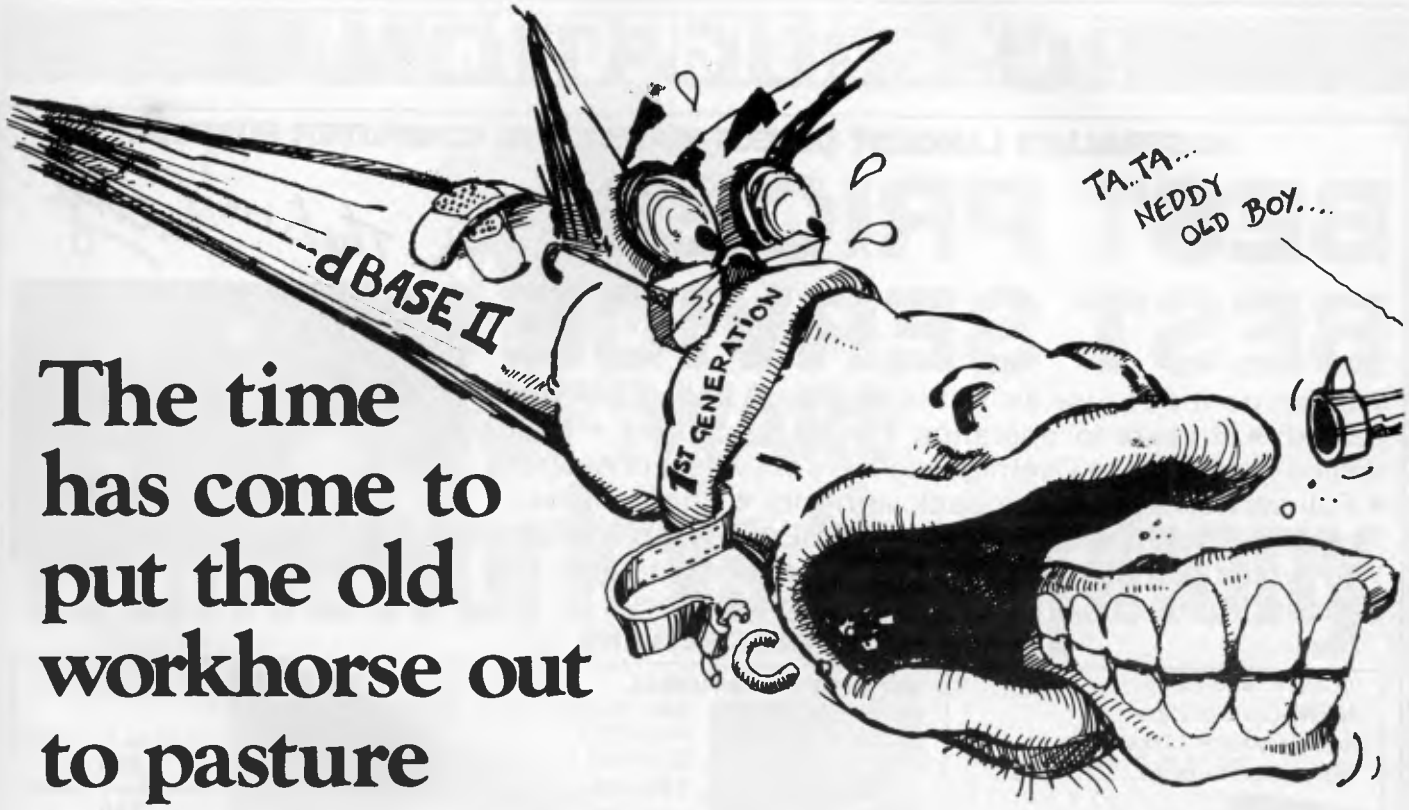
Notes

The program will run on any Commodore machine. By changing the character string commands for HOME and DOWN CURSOR, it will run on any micro supporting DEF as a basic command. By changing FNA (B) to a GOSUB routine, it will run on any micro whose Basic supports arrays.

```
0 :
1 REM ************************************************
2 :
3 REM                  TO SHOW MPU  CHIP
4 :
5 REM                  FLAG  SETTINGS ON
6 :
7 REM                  LOGIC INSTRUCTION
8 :
9 REM ************************************************
10 REM ..........MAINLINE OF PROGRAM.....................
20 GOSUB 30000
30 GOSUB 20000
40 PRINT
50 B$ = "PLEASE PRESS 'SPACE'" : X = 1 : Y = 13 : GOSUB 7000
60 GET A$
70 IF A$ = "" THEN 60
80 :
90 GOTO 30
1000 :
1001 REM *** SET NEGATIVE AND ZERO FLAGS ****************
1002 :
1197 :
1198 REM SET NEGATIVE FLAG BY BIT 7
1199 :
1200 NEG  = ABS( INT( ACC /128 ) )
1297 :
1298 REM SET ZERO FLAG IF ACC= ZERO
1299 :
1300 ZERO = ( AC = 00 ) * ( -1 )
1397 :
1990 RETURN
5000 :
5001 REM *** DECIMAL N TO HEXADECIMAL HN ****************
5002 :
5100 HI = INT( N / 16 )
5110 HN$ = MID$( HX$ , HI + 1 , 1 )
5200 LO = N - HI * 16
5210 HN$ = HN$ + MID$( HX$ , LO + 1 , 1 )
5990 RETURN
6000 :
6001 REM *** DECIMAL N TO BINARY BN$ ********************
6002 :
6100 BN$ = ""
6200 FOR Q = 7 TO 0 STEP -1
6210 :BIT$ = "0"
6220 :IF (N AND 2^Q ) THEN BIT$ = "1"
6230 :BN$ = BN$ + BIT$
6240 NEXT
6990 RETURN
7000 :
7001 REM *** PRINT B$ AT X Y ***************************
7002 :
7100 PRINT CHR$( 19 ) : REM HOME CURSOR
7200 FOR YY = 0 TO Y
7210 :PRINT CHR$( 17 ); :REM DOWN CURSOR
7220 NEXT
7300 PRINTTAB( X ) B$;
7990 RETURN
8000 :
8001 REM *** BINARY BN$ TO DECIMAL N ********************
8002 :
8100 N = 0
8200 FOR Q = 0 TO 7
8210 :IF VAL( MID$( BN$,Q+1,1 ) ) THEN N= N + 2^ ( 7 - Q )
8220 NEXT
8990 RETURN
9000 :
9001 REM *** HEXADECIMAL HN$ TO DECIMAL N ****************
9002 :
9100 A = ASC(  LEFT$( HN$,1 ) ) - 48
9110 B = ASC( RIGHT$( HN$,1 ) ) - 48
9200 N = B + 7 * ( B>9 ) - ( -1 ) *
     ( 16 * ( A + 7 * ( A>9 ) ) )
9990 RETURN
10000 :
10001 REM *** AND THE ACCUMULATOR WITH THE DATA **********
10002 :
10100 ACC = ACC AND DT
10200 GOSUB 1000
10990 RETURN
11000 :
11001 REM *** OR THE ACCUMULATOR WITH THE DATA ***********
11002 :
11100 ACC = ACC OR DT
11200 GOSUB 1000
11990 RETURN
12000 :
12001 REM *** EXCLUSIVE-OR THE ACCUMULATOR WITH THE DATA *
12002 :
12100 ACC = ( ACC OR DT ) - ( ACC AND DT )
12200 GOSUB 1000
12990 RETURN
20000 :
20001 REM ****MIDDLE*************************************
20002 :
20100 REM CLEARSCREEN,PICK CASE,PRINT HEADER
20101 :
20110 PRINTCHR$(147):REM CLEAR SCREEN
20120 MAX = 3 : MIN = 0 : CASE = FNA(B)
20130 PRINTTAB(10) OP$( CASE )
20140 B$ = HEADER$ : X = 1 : Y = 3 : GOSUB 7000
20190 :
20200 REM PRINT TRANSLATIONS OF ACCUMULATOR CONTENTS
20210 MAX = 255 : MIN = 0 : N = FNA(B)
20250 Y0 = 5 : GOSUB 21000
20260 ACC = N
20300 REM PRINT TRANSLATIONS OF DATA ADDRESS CONTENTS
20301 :
20310 N = FNA(B)
20320 Y0 = 7 : GOSUB 21000
20330 DT = N
20390 :
20499 REM GET & SORT GUESS INTO BINARY HEX OR DECIMAL
20500 B$ = "" : X = 1 : Y = 9 :GOSUB 7000
20510 INPUT"RESULT ";G$
20520 IF LEN( G$ ) < 1 OR LEN( G$ ) > 9 THEN 20500
20530 A$ = LEFT$( G$,1 )
20540 C$ = RIGHT$( G$,LEN( G$ ) -1 )
20550 IF A$ <> CHR$( 37) THEN 20600 : REM GUESS NOT IN BINARY
20560 BN$ = C$
20570 GOSUB 8000
20580 F = 3
20590 GOTO 20700
20599 :
20600 IF A$ <> CHR$( 36) THEN 20650 :
      REM GUESS NOT IN HEXADECIMAL
20610 HN$ = C$
20620 GOSUB 9000
20630 F = 2
20640 GOTO 20700
20641 :
20650 N = VAL( G$ )
20660 F = 1
20661 :
20700 REM GUESS HERE
20701 :
20710 G = N
20800 REM DO OPERATION
20810 ON CASE+1 GOSUB10000,11000,12000
20820 Y0 = 11 : N = ACC : GOSUB 21000
20900 REM UPDATE SCORE
20910 IF G = ACC THEN PNTS = PNTS + 10 * F
20920 B$ = "SCORE" + STR$( PNTS ) : X = 5 : Y = 13 : GOSUB 7000
20990 RETURN
21000 :
21001 REM *** TRANSLATE N AND PRINT AT Y0 ***************
21002 :
21210 GOSUB 6000
21220 GOSUB 5000
21240 B$ = BN$ : X = 1 : Y = Y0 : GOSUB 7000
21250 B$ = HN$ : X = 10 : Y = Y0 : GOSUB 7000
21260 B$ = RIGHT$( "   " + STR$( N ) ,3 ) : X = 14 : Y = Y0
      : GOSUB 7000
21290 :
21300 IF Y0 <> 11 THEN 21990
21400 B$ = STR$( NEG ) + STR$( ZE ) : X = 17 : GOSUB 7000
21990 RETURN
30000 :
30001 REM ** BEGINNING **********************************
30002 :
30100 HX$ = "0123456789ABCDEF"
30110 DEF FNA(B) = INT( RND(1) * ( MAX-MIN ) ) + MIN
30120 PNTS = 0
30130 HEADER$ = " BINARY  HEX DEC N Z"
30200 DIM OP$( 2 )
30210 FOR I = 0 TO 2
30220 :READ OP$( I )
30230 NEXT
30240 DATA AND,ORA,EOR
30300 PRINT CHR$( 147 )   REM CLEAR SCREEN
30990 RETURN
40000 :
40010 REM ************************************************
40020 REM A PROGRAM FOR MPU  COMPUTERS
40030 :
40040 REM BY A.D. MACHINERY
40050 :
40090 REM ************************************************

READY.


READY.
```



The time has come to put the old workhorse out to pasture

The days when dBASEII* stood all by itself at the apex of the database management pyramid are past. The old workhorse has been put out to pasture by a new breed of faster, easier, more powerful packages.

It's not that the old horse hasn't done its job: it has, gloriously. Those of you using dBASEII know that it has paid for itself many times over. In its time it was dBest. And now there's no denying that it's slow, it's cumbersome, it's difficult to live with — when you compare it with some of the newcomers on the market.

Fresh out of the starting gate.

So who are the newcomers that have usurped the old master's position?

Delta:

We regard it as the most complete user-oriented database system on the market today and for the forseeable future. Delta caught our attention when it received the UK government's prestigious RITA award for "best software of its kind", followed closely by IBM UK's adopting it as their own distributed product for the IBM PC. Everything we have learned about it since working with it here has served only to increase our enthusiasm. Delta has so much to offer — and you don't have to be a programmer to get it all.

Dataflex:

Dataflex is a true multi-file, multi-user database management system. "Flex" offers you unlimited flexibility in the development of high quality, easy to use database applications – in a minimum of time. "Flex" is for software developers everywhere, as well as for users with complex applications.

Take some advice from experienced punters.

"Dataflex . . . truly the best application development tool on the market today. Its power and flexibility have enabled us to write a total package in less than 50% of the time compared to conventional methods."

Tim Lamberton, M Sc. software consultant to Occidental Life.

"Dataflex allows the developer to devote his energies to good systems design because the nitty gritty of screen, file and report routines are superbly handled by Dataflex. The end user has the knowledge that his system can be easily modified and further enhanced."

Jeff Hooper Talon Systems

Place your bet on a winner.

Delta and Dataflex are available at leading computer stores everywhere. Ring your local dealer and ask for a demo. If he doesn't know about the product you're interested in, ring us. Or better yet, have your dealer ring us. It's time he got on the inside track.

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Framework vs Symphony

The battle is on for lead positions in the highly lucrative integrated software market with the main contenders being Ashton-Tate's Framework and Lotus's Symphony. Peter Bright, Kathy Lang and Mike Liardet give their verdict.

Ashton-Tate and Lotus are two of the most successful software vendors in the world. Ashton-Tate has the top selling database in dBaseII while Lotus has the best selling spreadsheet/graphics/database combination in Lotus 1-2-3. (1-2-3 offers no communications facilities, however, and you can't write a novel on either it or dBaseII.)

Both companies have decided to follow the current trend towards integrated software by releasing their own contenders for a highly lucrative market — *Framework* from Ashton-Tate and *Symphony* from Lotus.

Symphony and *Framework* are RAM-based and do not use virtual memory techniques which involve running data to and from disks. *Framework* has been designed to work on an IBM PC with just 256k of RAM, whereas *Symphony* demands a minimum of 320k of RAM, of which the program uses about 290k, leaving a measly 30k for the user. *Framework* will overlay little used parts of the program by pulling them in off disk when needed, whereas *Symphony* will only pull help screens in off disk. In practice, *Symphony* users will have to buy more memory to get the program to do anything useful: Kathy Lang (our database reviewer) only just managed to run the database Benchmarks on a fully-expanded PC with 640k of RAM! The *Framework* review system was pre-release and did not use overlays or fancy code-compression techniques, which makes it hard to forecast exactly how much memory will be needed. At a guess you'll probably get away with less than you need for *Symphony* — but not much less. Display-wise both systems need high resolution capability for graphics, but mono-chrome output can be obtained with a suitable high-res card.

First impressions

Framework looks very similar to the Apple Lisa/Mac and other 'friendly' systems. This similarity extends even to the point of displaying the 'desktop' icon in dapple grey and moving frames to the disk icon when you close them down. The trouble is that the limitations imposed by IBM hardware mean this approach can't be taken to the same lengths as in Apple's case.

Symphony, like Lotus 1-2-3, is very much a spreadsheet system in appearance. Whereas *Framework* stores information in 'frames', *Symphony* provides a single spread-sheet. Whatever activity you're engaged in, be it word processing, database or number-crunching, the information is all stored somewhere or other on the spreadsheet. As this is also true of 1-2-3 you may wonder in what respect *Symphony* differs. In fact, it appears substantially different: if, for example, you're word processing it appears like a word processor, though underneath it all is a massive spreadsheet. You could end up with the top left-hand corner being occupied with a word processor document, the bottom right corner taken up with a spreadsheet and the middle holding database data. You might find this hard to accept if you're used to each application having its own nice neat little pigeon hole.

Framework's 'frames' can hold data from any of the applications, and also other frames . . . you can have frames within frames *ad infinitum* until you run out of memory. Frames can be edited, made smaller, larger and dragged around the screen to your heart's content. However, if you have more than four or five on the screen at the same time it can start to look a mess. To solve this on a 'zoom' key fills the screen with a selected window.

Most *Symphony* commands are executed by a combination of the function keys and the cursor control keys. The same is true of *Framework* with the addition that *Framework* has to recruit some of the keys from the numeric keypad to take commands that won't fit.

Symphony

Most of the commonly used functions are contained within pull-down menus which are displayed along the top of the screen. The functions include disk utilities, creating a new frame, search and replace, text justification, setting graphs and printing.

Some of the functions in the pull-down menus are available whether you are in database, spreadsheet or word processor. For example, you know that whichever mode you're in, if you want to print something you go to the PRINT pull-down menu. This gives the whole package a much higher degree of uniformity and makes it easier to learn.

Framework also has context-sensitive help — wherever you are, by pressing the Help key you can get further information about the task Framework is performing.

Moving data

Moving data between different applications is one of the most important aspects of any integrated package. Framework allows you to move data in a number of different ways.

The easiest data transfer path is taking data from one numeric application and moving it to another numeric application. In effect, this means copying from database to spreadsheet, database to database or spreadsheet to spreadsheet; it doesn't include moves to or from the word processor.

If you want to include spreadsheet data in a word processor document, you have to get devious and contain frames within frames as follows:

First of all, create a new empty word frame. You can then copy both the document frame and the word processor frame into the new outline frame and print the outline.

Although this works, it is very clumsy, and getting the imported data exactly where you want it can be a problem. You can use the 'outline' feature (see below) to improve the layout and paginate the document.

(When you look at Symphony you'll see that it's much easier to incorporate selected spreadsheet data.)

The final method of data communication is via a 'pipe'. In any numeric frame (that is, not the word processor) it is possible to access data in another frame by quoting the frame name and cell reference. If the data changes in the 'parent' frame, then those changes are automatically reflected in all 'child' frames.

Outlining

Outlining allows you to use Framework's ability to handle frames-within-frames to create complicated report-style documents quickly and easily by using each frame to make up a page of the report. This is a powerful and innovative feature.

The outline can be used as an index page showing the names of all the frames and sub-frames and numbering them appropriately. Using the outline it is very easy to find and access the desired frame.

A simple outline might look something like this:

Martin Lack of Arcom Pacific, distributors of Framework: high hopes for the product

Doug Ruttan of Symphony's distributors: equally high hopes!

Example:

1 Intro
  1.1 Framework
  1.2 Symphony
2 Framework
  2.1 Word processor
  2.2 Database
  2.3 Spreadsheet
  2.4 Etc
3 Symphony
  3.1 Ditto
  3.2 Oh my God what next?

As it's so easy to switch between frames and create new sub-frames, you could easily use this feature as a sort of 'ideas processor' to impose structure on random thoughts.

Word processor

Like everything else about Framework, the word processor is RAM-based, so the number of pages of text that you get is directly proportional to the amount of RAM in your machine.

Most of the commands used in the word processor are exactly the same as in other modules of Framework. For instance, to copy a block of text use the EXTEND CURSOR and COPY keys in exactly the same way as you would in the rest of the system.

Those commands that are specific to the word processor are mostly contained within the pull-down menus at the top of the screen. For example, the WORDS pull-down menu contains commands for bold, underlined, italic and normal text as well as commands for the alignment and justification of text.

This makes the word processor very easy to use and the manual almost unnecessary.

Graphics

Framework can display six types of graphs and charts: bar, stacked bar, pie, line, scattergraph and X-Y. It can graph data from either a spreadsheet frame or a database frame.

The graphics functions are accessed from the GRAPHS pull-down menu, although experienced users will probably access the graphic functions through FRED (see below). Spreadsheet data can be selected using the EXTEND CURSOR key. However, database records will probably have to be run through a filter before they can be graphed.

Communications

When Framework is launched it will come with a communications program called MITE. Unfortunately this was not available at the time of the Benchtest.

Programming

Framework is supplied with a programming language called FRED ('FRames EDitor'). FRED is virtually a full-blown programming language in its own right. It can be used to access all the features of Framework with the advantage that it is totally programmable.

Database

A Framework frame, stored in main memory, can be viewed on the screen, printed, saved in a file or written out to a text or dBasell file. Thus it has in common with Symphony the ability to

process, as one unit only, as much information as can be held in the computer's memory. However, its method of use is a bit different, making it less easy to state exactly how much information you can process at any one time. Individual frames may be stored in separate files, or a complete outline containing several frames may be stored as one.

Record creation

To start putting records into a data set, you ask Framework to create a database frame. All you then have to do is enter the names of the fields you want. No indication needs to be given of length or type. Framework uses a default length which you can set up and change, by modifying the way the field names are displayed, using function keys. When data is entered into a field, Framework deduces from the characters entered what type of field this is to be. If you want to enter numbers into a field yet have its type as character, you can override Framework's assumption. All this means is that, in practice, a Framework database frame is very quick and easy to set up.

Database frames may be viewed either as a table or as a form, one record at a time. When the database frame is created, Framework creates a default layout for this form.

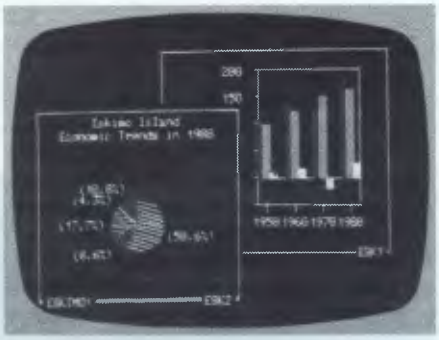
This layout can be modified simply by using a function key to 'drag' the field to the appropriate place. Field sizes and numbers are limited only by memory size — you could have a single field occupying the whole of memory if you wanted.

As is common with Ashton-Tate packages, there is no special format for date fields. However, a variety of functions are provided for handling fields as dates, which, to a large extent, solves the problem.

To modify the database form, you can add a new field at any time with the Insert function. You can add records in either the Form view of the database frame, or in the Sheet (table) view. As with Symphony, the fact that all information is stored in memory means that there is no need for separate indexing arrangements; access to all records is effectively direct. When amending records, you can select by using a filter to restrict yourself to just one or a few records (more on this below). You can also amend one field in every record in a single operation using an appropriate formula; for instance to raise all prices by 10 per cent.

SYMPHONY

Glorious technicolour



The usual graphics displays

And it's all really a speadsheet!

Displaying and printing information

When displaying data on the screen, you can either show one record at a time, using the Form view of the frame, or show 20 records in a table. Moving between the two views is simple — you just toggle with a function key. Records may also be printed out in either format. Alternatively, more complex formatting is available, using word processing features.

Selection and sorting

You can set up filters to decide which records to display or to delete. Filters may consist of many tests, combined with And, Or and Not. The syntax is very similar to that used by dBasell. You can also select particular records to be read in from a file, using a single criterion.

Records may be sorted into either ascending or descending order. You may only specify one sort field at a time, but the sort works in such a way that by specifying several sorts, least significant first, you can arrange the file in any order you please.

Advanced facilities

Framework has a programming language which allows you to tailor its use to particular applications. It can read files in most formats through its filtering facilities. At present, Framework can write files only in its own internal format and in text format — if you want to read in a dBasell file, make changes in Framework and return the file to dBasell, you must write the data to a text file and then get dBasell to translate it back to the original format. It is possible to link the DOS to run other programs, and this can be accomplished semi-automatically by running a .BAT file which exits back to Framework.

Spreadsheets

To start spreadsheeting in Framework, a spreadsheet 'frame' must first be created. First, select the 'create' main option, then specify the initial dimensions for the spreadsheet (that is, the number of rows and columns required — these can be changed thereafter)

SOFTWARE

and, finally, give the go-ahead to create a frame of type 'spreadsheet'.

Once the frame is created, it is displayed alongside all the other frames — this can be particularly useful when plotting graphs from the spreadsheet, or otherwise transferring its data into other frames.

Spreadsheet columns are labelled A, B, C, .., Z, AA, and so on, while rows are numbered. As an added convenience, cell references can use any labels that may be in the first row and column of the spreadsheet. Thus cell D10 could also be identified by 'Sales. March', if column D is headed by 'March', and row 10 by 'Sales'.

If an attempt is made to move the cell-cursor off the edge of the screen a fairly rapid redraw is made but Framework never redraws the entire screen, only the current frame. A further sophistication involves 'locking' the first row and column of the spreadsheet. This is, of course, the location for the row/column names that offer the alternative cell-naming convention. But, in any event, keystrokes made while the display is being redrawn are buffered. This can easily occur if one of the arrow keys is pressed, or held down for a few seconds. Several keystrokes are transmitted while the screen is being updated for the first keystroke, and immediately it is finished another redraw starts.

This is not as clever as it sounds. If you inadvertently press a key for too long, you can be treated to a lengthy sequence of redraws while the software catches up. This sequence can take several seconds to finish and is unstoppable. It can be particularly frustrating watching the cell you want scroll through the window and off the other side!

Framework offers 15 further keystrokes for moving the cursor further than a single cell at a time.

Numbers, text and formulae can be entered into the spreadsheet by moving the cell-cursor to the right place and then simply typing them in. Occasionally Framework might be confused by an entry. For example, 01-636 6890 will be interpreted as a calculation rather than the text of a phone number unless Framework is forewarned that text and not numerics is being entered.

Spreadsheet formulae can be built out of a comprehensive range of functions. In addition to '+' '*', '−', and '/', Framework offers functions for manipulating dates, handling basic statistics, finance, trigonometry and more besides. There are facilities for displaying various date formats, converting dates into numbers (of days elapsed since...) and handling times as well, and Framework adopts the usual spreadsheet convention (where function names are preceded by '@').

For example:

@COS(B23)

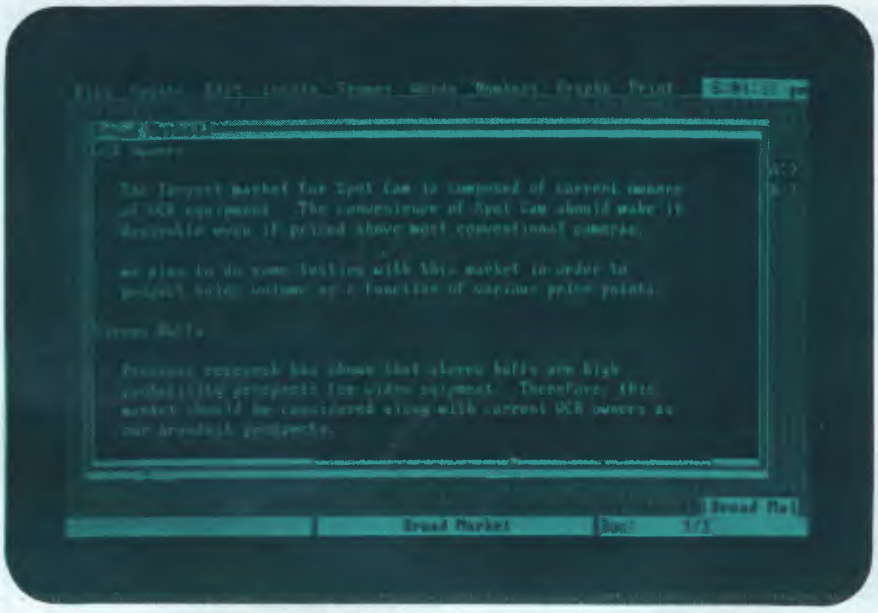
would calculate the cosine of the contents of cell B23.

In multiple-spreadsheet applications it is essential for formulae to be able to reference cells in other spreadsheets. Each frame can be given a name after it is created, and this is used in the cell reference for non-local cells. Thus, if there are three spreadsheet frames called "DivA", "DivB" and "Both", a formula such as:

DivA.Profit.Total + DivB.Profit.Total

could be used in 'Both' to obtain the total profit of both divisions. A further refinement is that a frame itself can be assigned a formula. This enables more 'global' spreadsheet manipulations, in particular consolidation operations, to be readily performed.

Since cell entries are generally fairly brief, most spreadsheet systems have fairly limited editing facilities for changing cell contents. Not so with

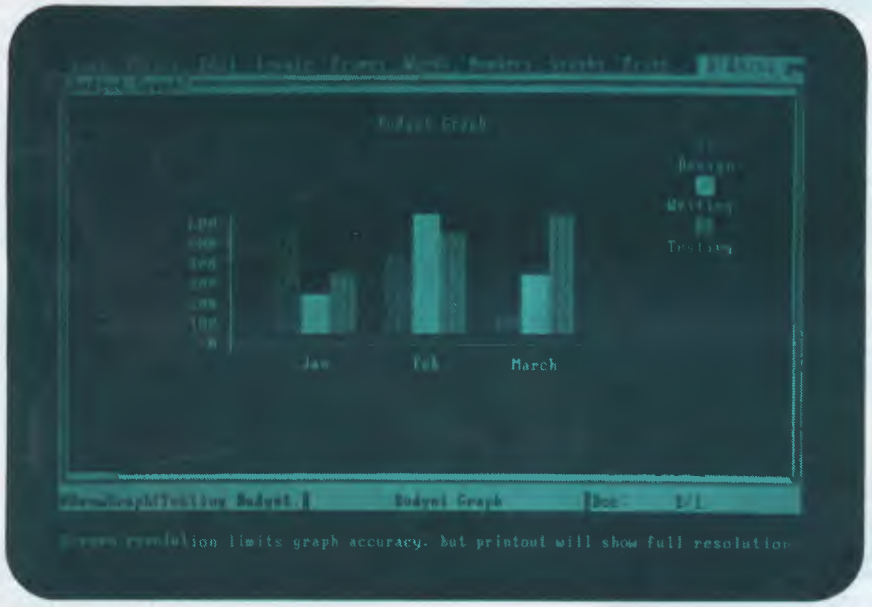


Framework! After all, it has a full-grown word processor elsewhere so it might as well give you full access to its editing power when you are amending formulae.

In general Ashton-Tate has attempted to do this sort of factoring of resources throughout Framework. This greatly reduces the learning effort. Pressing the 'home' key gets you to the top of a word processor document or the top of a spreadsheet depending on context.

Framework offers extensive spreadsheet formatting facilities. These include the usual variable column widths and scientific displays but, in an attempt to appeal to the business user, Framework provides a wide variety of styles for displaying financial figures. Thus it is possible to arrange for parentheses around negative numbers, and a choice of currency prefixes or suffixes.

The rich variety of functions in Framework will be primarily of use to the spreadsheet worker, but they also constitute a major part of FRED. In the standard release of Framework, FRED will be fairly lightly documented (except for the functions), since most users will not need it; but Ashton-Tate plans to release full documentation of FRED to expert users or programmers who need it for sophisticated applications.



Symphony

Three of the most commonly used Symphony commands are 'services', 'menu' and 'help'.

The services key provides functions such as disk operations, printing and system configuration common to all applications within Symphony. The options from the menu key will vary according to what you are doing. In both cases pressing ESCAPE will get you out, although sometimes the menus provide a specific get-out option which is a better choice. The help is context-sensitive and is pulled in from disk. (This was not working on the review system).

Help is provided in the form of the window manager. When you define a window, you can specify the area of the main worksheet to be accessed. This can range from the whole worksheet to just a few cells. When you are within the window you can scroll around as much as you like until you hit the boundaries set in the window definition, at which point the machine bleeps and won't let you past the border.

Once you have mastered this idea, Symphony is much easier to live with because you are back to the idea of separate areas for different sets of data.

The window manager will also allow you to do all the usual window tricks — expanding and contracting a window, moving windows, and zooming into and out of a specific window.

Integration

A window can be in any of five modes: SHEET (spreadsheet), DOC (word processor), GRAPH (graphics), FORM (database) or COMM (communications). The important point to remember is that you can easily switch the mode on the fly. For example, if you were preparing a memo which contained complex tabular data you would proceed as follows.

First, select DOC to enter word processor mode and type text until you reach the point where you want to insert the tabular data, then select SHEET. Your document will stay on the screen, but instead of displaying line and column numbers, the borders will change to spreadsheet mode showing cell references. The window is now a spreadsheet and you can then enter your data, formulae, and so on, and produce your table.

Finally, you can switch back into DOC mode and carry on entering text after

the tables. The only restriction is that tables entered in spreadsheet mode, can't be edited in the word processor.

This ability to switch modes on the fly is one of the most impressive aspects of Symphony. If you attempted to perform the above example in Framework, the job would be much more difficult.

Moving data

This is another area where Symphony scores heavily over Framework and other more conventional integrated packages.

Moving data around within a single worksheet is a piece of cake because all you're doing is moving data from a part of the worksheet that contains, say, a spreadsheet model to another part that contains, say, a word processor.

Moving data from a section of one worksheet to another worksheet requires more care, but it is still very straightforward.

Wordprocessor

The Symphony word processor is very simple and uncomplicated but those among you looking for WordStar-type power and features had better look elsewhere: this word processor is designed for knocking out memos not typing *War and Peace.*

All the word processor-specific commands are accessed by hitting the menu key; other functions such as printing and disk operations are accessed through the services menu. The available options are Copy, Move, Erase, Search, Replace, Justify, Format, Page and Line-marker. Most of these functions are standard and need no explanation, but I will go into Line-marker and Format in more detail.

Line-marker allows you to assign a name to a specific line in the text. You can then GOTO that line by name without having to wade through the whole document.

Format allows you to specify tab stops, justification, line spacing, margins, and so on. The interesting thing is that as well as defining default settings for the whole document you can also create a number of 'format lines' with different settings. As you go through your document you can call different format lines to alter the layout of the different sections.

The only major problem with the screen layout is that if you set the line spacing to double or triple spacing, it will still show up on the screen as single-spacing. As I am more used to the WordStar what-you-see-is-what-you-get style layout I found this annoying. Also you have to imbed special control codes into the text if you want to produce, say, underlining on bold. This is a messy way of doing things considering that this is supposed to be a friendly system.

Graphics

Symphony allows you to create a wide range of graphs and charts. Although it will work with the standard IBM colour display, the comparatively low resolution limits the display. Symphony graphics allow for six types of graphs: pie, XY, line, bar, stacked bar, and high-low-close-open. The graphs are contained within 'graphics windows' and take their data either from a section of a spreadsheet or database.

All the settings for a particular graph are controlled from the oddly named '1st Settings' and '2nd Settings' menus. These allow you to control a bewildering range of features: the graphics sub-system is the most complicated section in the whole package, but is easy to use once you get used to setting it up.

Communications

Unlike other integrated systems Symphony is not equipped for sophisticated mainframe communications. Instead it contents itself with providing comprehensive micro to micro links along with the ability to access the popular dial-up information services.

The communications protocols can be altered from the SETTINGS option on the main menu.

Apart from allowing you to play around with the baud rate and parity, Symphony also allows you to control some more esoteric features connected with auto-dial/auto-answer 'smart' modems. With a bit of work it should be possible to hook most modems to Symphony.

COMM allows you to transmit and receive sections of worksheet and whole disk files. It can cope with both text and program files. The latter are transmitted and received using the XMODEM protocols which are widely used in the micro world.

A nice touch with this system is that it can translate data produced on a foreign PC into British characters. It is unlikely that many people would use this in their day-to-day work, but it could be useful to, say, multi-nationals and the like.

Macros

Macros allow you to write rudimentary programs consisting of Symphony commands which can be called by a few

Continued on page 105

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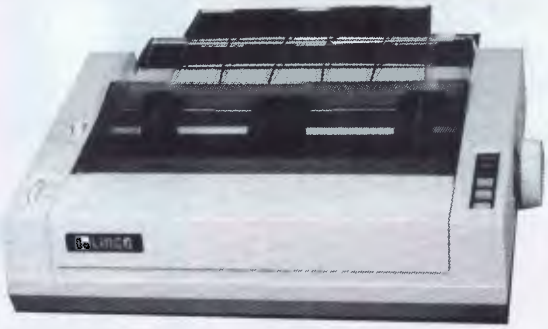

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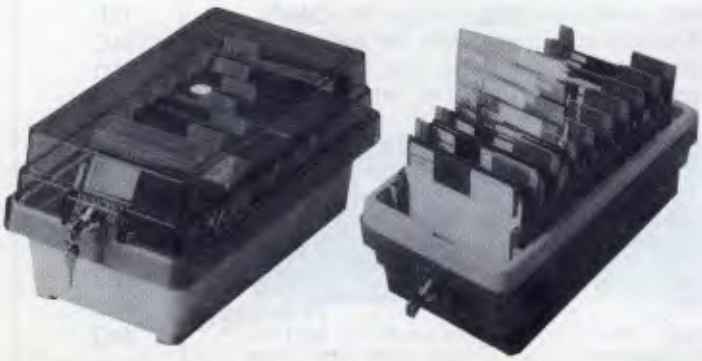

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Serial Adapter RS 232C	129
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Amber Monitor	299
	$2,712

APPLE IIe	
As supplied with 80 column facility RGB color, printer port, single drives, controller, Hi Res Monitor average of quoted prices	$3,170
Extras to bring to same level as LINGO 128	
Second Drive	465
64 K Card	578
RF Modulator	51
Voice Synthesizer	35
	$4,299

	LINGO 128	MEDFLY	CAT	APPLE IIe
Processor	6502	6502	6502a	6502
Z80 processor for CP/M built in	YES	YES	NO	NO
RAM memory standard	128K	64K	64K	64K
Enhanced microsoft basic	YES	YES	YES	NO
Size of interpreter in ROM	24K	NIL	24k	12K
Numeric keypad	YES	YES	YES	NO
80 column text display built in	YES	YES	YES	NO
Voice synthesizer included	YES	NO	NO	NO
RGB colour output standard	YES	YES	YES	NO
RS232 serial adapter included	YES	YES	NO	NO
Centronics printer part included	YES	YES	YES	NO
Twin drives built-in	YES	NO	NO	NO
Whisper quiet Chinon Japanese drives	YES	NO	NO	NO
Numeric keypad	YES	YES	YES	NO
Separate processor for keypad	YES	YES	YES	NO
RF modulator included	YES	NO	NO	NO

EDUCATION

NEW 1985 NSW COMPUTER SYLLABUS

MY FIRST TECHNOLOGY ALPHABET

Give your Education Minister a head start with computer awareness

Alive with long-winded committees, animated by Premiers' promises, and vibrant with teacher and parent frustration, My First Technology Alphabet involves several of your Education Ministers' senses in the learning process. And with more senses involved, your Government learns more, remembers more . . .

Look . . . as pictures are drawn right before your Education Ministers' eyes, each associated with dying industries and high unemployment.

Listen . . . as playful tunes encourage your Government to imagine an Apple or an Atari in every kitchen, linked up to ever-changing networks.

Touch . . . the correct key and your Education Minister gets a musical and visual reward each time they face the future and not the past.

Australian education administrators

The Chinese character for 'crisis' is made up of two characters: 'danger' and 'opportunity'.

Crisis in an up-side down world

If you have an involvement in education — as a parent, or as a teacher, or as an educational administrator, you'll recognise the crisis, the danger and the opportunity.

Danger: an antiquated elephant of an industrial style educational bureaucracy, an administrative animal of turpid ideological digestion stumbling a decade behind the technological real world. An under-trained, under-funded administration over-loaded with mine-fields of options.

An upside-down world with a computer in every kitchen, but next to none in the schools. A world of information that used to cost nothing, which now you have to pay for. A world blasted with innovations ungraspable in the detail of their implications.

Our educational administrators stumble toward God; tense with their impossible decision load. There they are, the meat in the sandwich, halfway to the heaven. Teachers and parents cry out for blood. "Why does the machine move so slowly?"

Three things are going to affect our political future. One is the increase in mind-workers. The second is the new staggering jump in the decision load. And the third is the computer.

This world will have new rewards. It will reward those people who are quickly adaptive to change; who are flexible, able to work for more than one boss, and may even at the same time, to serve as a boss. It will pay off for people who are curious, inquisitive, eager to find out what is going on and influence it; people who can keep their heads in the midst of disorder and ambiguity.

Back in 1916, the Dean of Stanford's school of Education described schools as "factories in which the raw materials are to be shaped and fashioned into finished products in accordance for specifications for manufacturing".

Now we need a new set of specifications, an education for ambiguity. Alvin Toffler, in his new book 'Previews and Premises', (Pan Books, 1984, $7.95) notes that if the industrial revolution gave us the "prolitariat" we might say that the information revolution is producing a "cognitariat" — a group based on knowing, on the use of the mind, rather than the use of muscle.

The cognitariat possess information, imagination, and other cultural qualities essential for production. It owns the means for production of information. (Marx would have a good laugh about this one). It owns what might be regarded as either essential raw material, or alternatively, a set of mental tools.

Like the Land of Oz, somewhere ahead looms the bright half of the crisis: opportunity. In this geography, we have nothing to lose but our preconceptions. Today's technology shows us the school of the future — not a building or timetable, but a network of services. Making the leap of understanding to a new educational community, understanding that life is the art of drawing sufficient conclusions from insufficient premises.

Education by Electronic Mail

TeleLearning points one way for Australia

TeleLearning's Electronic University enrolled its first student in an accredited course last March. A student in the Electronic University studies course material and completes assignments using a personal computer, then transmits the work directly to the instructor's electronic mailbox. Within a day or two, the instructor sends a response to the student's mailbox. Instructors hold "office hours" when students can contact them directly.

TeleLearning provides a delivery system for courses developed and accredited by universities and community colleges. Instructors develop new courses using TeleLearning's authoring package. TeleLearning codes and digitises lessons and graphics for each instructor. A student buys a software package and a simple modem from TeleLearning and enrolls in the course on-line. The software package includes an operating system and a front end for communications to reduce the sign-on procedure and protocols to a keystroke.

Students and instructors introduce themselves to each other at the beginning of the course. An instructor typically spends twenty minutes per lesson with each student's work and can individualise questions and problems to fit the student's interests. Students and instructors find the system convenient and flexible — they can complete the work wherever and whenever convenient.

TeleLearning uses the Tymnet, Telenet, and Uninet public packet switching networks, switching automatically from one to the other in case of network problems. A communications analysis system monitors all functions and handles routing and error corrections. By compressing data and batching complete files, the system cuts communications costs to a minimum. The TeleLearning system runs on the IBM PC, Apple II series and the Commodore 64.

The Erskinville Four

Managing one computer per 283 children

Take four lateral thinkers. Give them the responsibility for computer education of 850,000 kids in 2500 schools. Give them a budget of 50 cents, a couple of Ataris, a BBC Acorn or two, and some regulation desks. Supervise the four with seven committees.

Is this a george Street video disc game? A sort of educational policy Pacman? No Sir. It's the Erskinville Computer Centre, the heart of all things innovative in government computer education in NSW.

Because necessity is the mother and father of invention, The Erskinville Four, seem to survive, and even create fabulous policies of subtle awareness out of the sparse fodder tossed their way by solomn conjunctions of educational intent delivered by the NSW Education Department, and the Commonwealth Schools Commission.

You'll find the four; Paul Jenner, Richard Wiktorowicz, Phil Langtry and Bob Baker upstairs in the heavily barred Erskinville Primary School in inner city Sydney.

Up at head office, they talk about Erskinville Unit as a 'critical mass'; not as in irritated lump, but more in the sense of dynamically tense event, about to happen any moment.

The Unit does feel dynamically tense; all smoke filter-tips from pale-coloured low-tar packets. All four speak with unusual charismatic energy; their mood feels earnest, evangelical, but frustrated. The group has no Officer in Charge. The position is up for grabs, and all have applied.

"We sometimes feel like we are the meat in the sandwich. People don't think we do enough. We get a lot of broadsides. We get blasts from teachers."

They live on promises of funding for example NSW Premier Wran has promised $5 million over four years to support hardware in government schools, and to initiate a programme for computer awareness for girls and a software project for primary schools.

Getting ready for the future and for funding, the Unit can sometimes be found down in the electronic games parlours on George Street Sydney. They are looking at the new technology — interactive video disc is aready in the games parlours but not in the schools. They look for the games that the kids are taking to.

"We're all waiting for video disc to come out", they say, looking ahead to fully interactive computer-video teaching methods, voice technology, and global databases.

The Commonwealth is also about to deliver $1.4 million to NSW schools — all of which must be spent in the government sector by December 31.

Throughout the NSW Education Department curriculum committees and task force groups abound; a complex web of cross-referenced and deadly serious lets-get-hep- about-computers intent.

They have their hearts in the right place. Trevor Harrison, is the punctilious administrator of the Division in charge of the Erskinville Unit computer curriculum advances in NSW. He collects pottery, the mysterious, ethnic kind, that look like rocks in a stream bed. He's just started an evening TAFE course in computer awareness. His office walls wear subtle moody etchings.

Next door, Assistant Director, Col MacDonald, in a Tartan tie and a military moustache, seems a more ebullient personality. He likes trains and scientific ideas. His office has large colour photos of steam trains, and small perspex cubes with scientific items — bugs and moss-embedded.

Both will talk at great length and vast detail about the intricacies of computer awareness policies in NSW. The viewer leaves with a feeling of great sincerity and the vast administrative difficulties of processing any new idea through the educational system.

From an outsiders viewpoint, the curriculum development process in the NSW Department looks like a murky ponderous fog of committees, all achieving next to nothing and certainly not fast enough to begin to keep up with real-world computer needs.

One can confirm that the Department has three curriculum bodies; a Syllabus Project team for years K to 12, a Syllabus Committee, and a Junior Board and a Senior Board.

Money for development comes from a number of hard-to-pin down locations. State Premier, Wran, has promised $5 million. Not every one is sure that he will deliver on his promise, so when so this funding is referred to as the $5M "Election promise".

The Commonwealth funds have offered funds based on the ideas as UK Micro Electronics Programme. This funding focuses on teacher training the Units speciality.

The formal outlines are a committment of $18.7 million over the three years from 1984. In 1984, grants of $6.234 million will be made, $4.987 million to government, and $1.247 million to non-government schools.

The Commonwealth Schools suggests that the following principles should be followed in the introduction and administration of the program:

- The program should be broadly based and not limited to the provision of hardware.
- Computers should be introduced and used in schools in such a way as to support greater equality of outcomes in education.
- There should be community involvement in the decision making process, with consensus being sought regarding the allocation of resources at school, state and national level.
- The needs of girls and students from disadvantaged groups should be given special attention.
- The primary responsibility for deciding on the allocation of resources among the program components should rest with states, systems or schools as appropriate.
- The program will concentrate initially on secondary schools.
- A co-ordination mechanism should be established at regional, state and national level.
- Wherever possible consideration should be given to co-ordination of activities between government and non-government schools.

That's the theory. The practise isn't so easy.

All these administrators are good people. But what can they do? The thundering herds of technological innovations may gallop past the whole slow-moving mechanism. Like Telecom, they may be left behind, like a giant rock on the plains. The new ideas will find ways round them, because they can't go through them.

Meanwhile, the four at Erskinville, are a sort of statement of intent to have new ideas. They've got plenty, they speak their minds in a manner most unexpected of public servants.

APC have introduced you to the Erskinville Four, and delves into the philosophy behind the new 1985 Computer Awareness Syllabus for 850,000 NSW children.

Phil Lantry: no mystical transfer when you plug in your computer

Richard Wiktorowicz: Why computers are toys for the boys.

Phil Lantry

Crazy ideas about computers

But no mystical transfer when you plug it in

Phil Lantry was still breathless from a 1000 km drive from Bathurst to Broken Hill to give computer training courses to Broken Hill teachers where he had a NEC hooked up to the Australian Beginning data service. "It's mind-blowing for the teachers at Broken Hill to communicate with Melbourne with batteries and an acoustic coupler", he laughs.

"For their course, the Unit tend to use Ataris, because of their portability," says Lantry. Carrying computers up and down flights of steps, unpacking on Saturday night these are the hidden factors. Half the job at the Unit would appear to entail delivery loading and unloading computers at Inservice courses throughout the State.

"People who complain about NSW being slow to come to the party should look at a map of NSW," says Lantry. "Population centres all over a vast territory."

"People point the fingers at computers." They want action, but, says Lantry, "We've had computer courses since 1974, when we had a Fortran option in the senior syllabus." But things were different then, he recalls, then you needed a mainframe. There were no computers. The teacher would have to take the cards and use the computer at Sydney University.

"The kids filled out the cards. The Uni would then batch and send them back. It took weeks. Syntax error was a bit of a problem," he admits.

"If the social structures changed to keep up with the technology we would have less unemployment. We don't have to work a 40 hour week, 5 days a week. We don't have to stick to the old factory structures. That's why the syllabus will support debate on technology and change."

At the Unit, there is talk of extending the debate of a senior course on society and technology for year 9 and 10.

Lantry sees the new syllabus as not about computers in classrooms, but how technology works in a wider context.

"Australians have a mixed set of responses to computers," says Lantry. "The older generation has a monstrous fear, but kids don't feel that fear. For kids, the stuff has always been there. They can't remember life without a TV.

"Others think there's a sort of a mystical transfer when you plug in your computer," he says.

A third view, also misplaced, according to Lantry is from people who think that learning about computers is learning about how to programme a Cobol. "That's wrong," he says "new computers have changed that. I know one teacher who has bought a MAC, for example. He used to be a gung-ho programmer. But he hasn't programmed since he got the MAC. He's quite happy with MacPaint and MacWrite.

"Another big phobia" reports Lantry, "is that teachers will be replaced by robots. This viewpoint imagines children will be locked in dark rooms, hunched over their terminals, longing to be outside chasing butterflies and kicking sand in each others faces."

None of these views are right, holds Lantry firmly. "A computer is just another tool. You have to competent on it, and also recognise that education is more than just transmitting knowledge on a cold and precise manner. The interaction between people is the more important factor."

Lantry has been with the Unit since June 1980. Like the others, he'll go back to teaching when his time is up at the Unit.

Lantry taught for nine years at Ashcroft High School at Green Valley. He sees a great potential in computers for both the more talented and the not so bright.

"If for example a child is talented in music — give them a synthesiser. If they are good at writing — let them loose on a word processor," he says.

"You can often find people debating the computer to kids ratio. Some say it should be 1:1, others say no, no, it should be 1:2. It's a silly debate. There's no optimum ratio," says Lantry.

"Often I use one computer on a trolley, for example, when explaining a business simulation — an interaction between four companies, with the class divided up into four groups, each with a chairman of the Board.

"That's just a way of using a computer as a teaching tool. Ratios are not so relevant. If you have just one computer in a school, you can still use it productively," holds Lantry. For example, he says "Sometimes, if I am teaching word-processing, I may have 30 computers in a classroom, but I may use only one."

Lantry takes a special interest in the Inservice computer courses to schools, and meets five times a year with the States Regional Computer consultant.

"We give courses in special interest areas that the regions can't cover. For example datacoms or networking. A single region may not have enough people interested, but we can gather people from the regions."

Lantry also works with others in the group to develop materials schools can use in their course; leaders materials and participants notes for example on "The writing process, and word processing."

He's also interested in Software evaluation, communications and data-base. He mentions a Commonwealth proposal to download software to schools that was recently dropped because of the documentation problems.

Lantry is investigating other ideas. For

Bob Baker: What to say after you say hello to your software vendor

Paul Jenner: New hardware specs in a minefield of options.

example, he says, some TV stations go off-line at midnight. That means after 12 p.m. you have to full 625 lines to use for data. Teachers would just need a semi-intelligent adapter, and key in say Geography/Education, and leave their machine on to collect the data at night. With 625 lines, he says, you could have error checking. Lantry has been using the TAB as a remote database experimentally and the US Source. A policy decision to permit the use of on-line database has been eight months in committee at the NSW Education Department. Lantry, meanwhile pays for his data base subscriptions for school demonstrations out of his own pocket.

Also, he'd like to be able to demonstrate Teletex, but the problem is that he can't get an adapter. "You have to butt the TV with the adapter in it, and then have your aerial tuned by a service person.

Richard Wiktorowicz

Women, girls and computers

Why computers are toys for the boys

Computers and girls! This one comes over as a real curly issue, especially among many male administrators who resent high-energy feminist in roads Richard Wictorowicz who is the only male on the Non Sexist NSW Education Committee, speaks very carefully:

"There are differences," he says, "from infants upwards in girls and boys responses to computers.

"In mixed classes," he notes, "girls tend to stand back and let the boys take over. Boys take readily to the technical aspects, and tend to dominate the machines at the hand on sessions," he reports.

"In mixed classes, this is a problem," he says. "However, it seems that if you give girls separate classes to begin with, they lose their fear, and then when they come back into mixed classes they then participate fully."

"But," says Wictorowicz "not enough is known about these things. There is a need for research to answer the questions on what are the different needs for boys and girls in computer training. Whatever the needs, because of the political heat of the question, he says:

"The need is for a softly softly approach — a move toward long term change in attitude and in practise.

"There are plenty of pre-conceptions; like girls do word processing, and boys do programming." That's a classic.

"But it's one thing to set up an option, and another thing to act on it," he says, noting that no woman applied for positions at the Erskinville Computer Unit, and that it took him 20 refusals before he got one woman teacher, Janet Kennet to work in the Unit's hardware section. The question of how to handle sex roles is question of attitudes," he says "In the CAMP materials, this presents an area of concern for.

His solution; to avoid explicit comment, but to use example which present women and girls handling technology with authority. Richard has a few problems. "I'm the only male in the non-sexist Education Unit," he feels that the women on the committee feel that he doesn't do enough.

He takes a pragmatic view. "Most men in the Education Department," he says "I find energetic feminism distasteful." This he gives as the argument for involving in what they call at the Unit, the: "Girls Project".

"If men are involved the project will gain more status, he suggests. Other men feel if men are involved — then it must be important. If the organising groups are predominantly female, this will diminsh the authority of the project in the eyes of male educationalists," he argues.

"It's male administration," he says. "The typical attitude is: "It's those feminists at it again. The Girls Project aims to change the attitudes of both boys and girls because," says Wicktorowizc, "There's no point in leading girls to new options if they get the doors slammed in their faces."

"It's a delicate road to tread," he sighs, "I'm a foreigner in the home camp. The women on the Non-Sexist Unit treat me in the same way that they say men treat them," he says.

"But you can't appoint women if they don't apply" he notes.

"In funding, no one knows what's going to happen," he says. "What we can be sure of, is that if the Girls Project doesn't get funded, all hell's going to break loose."

Bob Baker

Teachers software evaluation guide

What to say after you say hello to your software vendor

Bob Baker used to be a maths teacher. He gets excited about the investigative and problem-solving applications of computer technology.

"Students should have the power to investigate, rather than duplicate," he says. Computers can help students discover principles, based on real world examples. "Put a computer in a classroom," he says, "and the border lines between maths and other disciplines blur." Baker looks to the potential of business simulations, strategy games, and scientific simulations.

"Four years ago, if you asked where in

The new 1985 Computer Awareness Syllabus

Computer Awareness Materials Project

The idea	The action
1. People control technology Technology doesn't control people	Materials present technology as controllable tools.
2. Accepting rapid change	Resources current and adaptable. Context accepting of many answers to the same question.
3. For all students	Material presented without overhanging values — straight information, with a range of people and institutions represented.
4. Technology empowers	Syllabus material will show people in control; making decisions.
5. Technology empowers both men and women.	Materials to present without comment males and females in roles of equal technological competence.

The CAMP material will consist of slide sets, videos, overhead master worksheets and current materials such as up-to-date technology clippings from newspapers. In order to save teachers legwork there will also be collected source materials related to the case studiers, and ideas on how to use the materials.

At Erskinville, they take care in talking about the new 1985 computer awareness syllabus. They feel that they have to take care in what they say because "teachers fear that they will get dumped with a syllabus to enact — an extra burden to their already over-burdened schedule".

The decision as to where in the school the syllabus will fit will fall on the Principal. The choice of who will teach it also rests with the Principal. No computer skills are required of the teacher who will have access to the Erskinville training resources.

While they won't talk about the syllabus, the Unit will talk about CAMP, their Computer Awareness Materials Project. CAMP illustrates the philosophy towards a syllabus; a set of standards on computer education. CAMP will consist of eight teaching-learning kits. These are case study materials about computers in the real world.

Teachers will be employed to develop the kits, which will also have seven self-instruction modules for teachers to help them define "computer awareness".

the curriculum do computers fit, you would have said maths," he notes. "Now we feel that any teacher may have a role, and although they will tend to come from the social sciences, English, History and Mathematics, there is no reason why the computer specialist should not rise up out of the Home Economics or Music Department."

Inservice courses run by the Unit and generally on Ataris — because the Atari is easy to carry. Although an effort is made to use other contract machines on an even basis.

Software, Baker favours for training sessions for parents and teachers are AtariWriter for word processing and "Marketplace" for business simulations.

He also uses McGraw Hill "Search" series on the Apple II plus and the basic finance programme "Lemonade". In this, he says, "you buy sugar, lemon, pay for advertising, decide how many glasses you plan to sell."

Parents attending the course are quite often experts in computing, he notes. "Their interest is in making sure that the Education Department is taking a real-world application to computer training in schools — that it isn't divorced from reality."

The Unit also notes people who know almost nothing, and others who want to know curriculum details in particular areas, for example on Logo.

For the course, Ataris and sometimes an IBM XT running Visi On. They have also used a MAC loaned by Apple.

Another software product that turns on Baker's mathematical mind is "Factory" for Atari.

He describes the joys of Factory: "You have three machines graphically on screen. These machines punch holes which are either round or square, and have variable size. You can also use the machine to add a stripe. You can choose the width of the stripe; thin, medium, or thick . . . You can move your work to a specified angle, or rotate it. This means you can describe an object, punch a square hole, rotate it, punch another, then put two machines in series, or set up a whole factory; a row of machines with different functions. A student can then plan to produce a particular metal product and set up the factory to do it.

One of Bakers special projects with the Unit is the Teachers Software Evaluation Handbook. Now in the final proof stages it will be distributed to software authors, and to teachers.

The booklet looks at content; classroom applications, and curriculum relevance. It considers racial, social, and sexual bias. The 30 page booklet also covers technical features; for example focusses on the nature of rewards built into courseware. Teachers are encouraged to check and see if the reinforcement methods are of the right type. Baker comments: "In some software, we have found that the rewards are sometimes better for the wrong responses. Some software can give children a nice reward when they get a wrong answer for example a small animated graphic alligator eating a man if you get an answer wrong, but just a 'Yes, you are right,' when the child gets a right answer."

The booklet also points out that immediate feedback to questions is preferable to feedback at the end of a block of questions. "Why you went wrong" feedback is preferable to simple "right" or "wrong" responses.

The booklet also considers the practical application of the software in the classroom, and asks "How easy is it to use, what preparation is required by students and by teachers and what follow-up is suggested.

The guide asks teachers to check support materials and their quality worksheets, teaching ideas, and manuals.

The Unit won't give any seal of approval or Educational Department rubber stamp to software "because," says Baker "each teacher has different needs and resources."

But the Unit will ask teachers in particular curriculum areas to review software. These evaluations will then be available through the library services SCAN journal, and perhaps online through a bulletin board.

The Unit plans to take on an extra 4-5 people soon as a software evaluation and development team. This group will evaluate and annotate up to 15 packages a week. Teachers across the State have already begun to offer to help with the evaluations.

Paul Jenner

The new 1985-87 schools hardware contract

New specs in a minefield of options

Paul Jenner likes hardware. He likes software too and all the new exciting new technology things on the market,

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and in their use in schools.

He's the individual who clearly has a major impact on the contract hardware choices. He says there will be changes in the coming new contract.

"In the past", he says "The specs have been for hardware, for example, memory capacity and the fact that the machine has to be able to run a cassette and a disk drive."

"Obviously, at least we'll want it to run all the standard packages word processing, spreadsheet, database, communications and graphics."

But the Unit's recommendations will probably break the spec down into two software needs groupings a package that will run wordprocessing, communications, and Logo, and a second which will run graphics and structured languages. Then they will specify a third which will have multi-user capacity.

Another change in the specification is expected in the call for the people who tender to provide a package deal which includes peripherals such as printers and communications equipment.

This change is inspired by the difficulties schools have in buying peripherals from different suppliers. The interfacing problems often ultimately fall back on the Erskinville Unit.

Suppliers will be expected to handle all the interfacing problems, and to warranty all peripherals.

Portability as a factor in the specifications depends on what comes available between now and the date for the new tender arrangements. Graphics developments will mean the likely inclusion in the contract of "pointing devices", e.g. mice, touch tablets and light pens.

"Bringing new ideas into the contract specifications is not as difficult as expanding the range of old ones," he notes.

"With things like the MAC, for example, it's easy, because it's new. There's no precedent"

He suggest the same may be true of bringing portability into the contract as a specification.

Baker liked the new technology toys. Among the exotic paraphernalia on his high-tech Atari test-desk was a "pointing device", the Koala Pad, which comes with the futuretronics software, Micro-Illustrator. This gives a colour MAC-type graphics menu on screen. Baker demonstrated it on a Rank Arena 800 line colour TV monitor, which stood on the work shelf next to an NEC mono character display terminal.

He also had, hot-to-go a software package called "Atari Lab Temperature". He demonstrated by putting the computer-connected thermometer in his mouth. A graphic display of three thermometres appeared on screen, each one showing the change in temperature over a five second time period. The bulbs disappeared, and to be replaced by a bar chart, and then a line graph of the temperature change over time."

To purchase items like the Koala Pad, and software like "Temperature" strictly speaking teachers should get three quotes. "It's crazy," says Baker frankly. "You don't have to get three quotes on text books."

"The Unit remains a minefield of options," says Jenner. "One option is software development. Here the Unit will try to fill the gaps; give teachers what they want, in a form that will be useful whether a school has one computer or 30. 'Exemplary software' is what the Unit plans to deliver; software that provides example to commercial developers that says, 'This is the quality'. 'This is the packaging'.

"The Unit is after ideas on what to do, and plan to develop a software development task group of teachers and programmers committed to providing software across all the contract machines.

"The exception might be where the Unit would approach a publisher who had a good software product but just on one format, for example, Apple. Then the Unit would take on the responsibility for re-writing for other contract formats."

Comment

Teacher software piracy solution

By Mark and Greg Simon, Authors of MATHS INVADERS

Computer Cognition Unlocks its Software

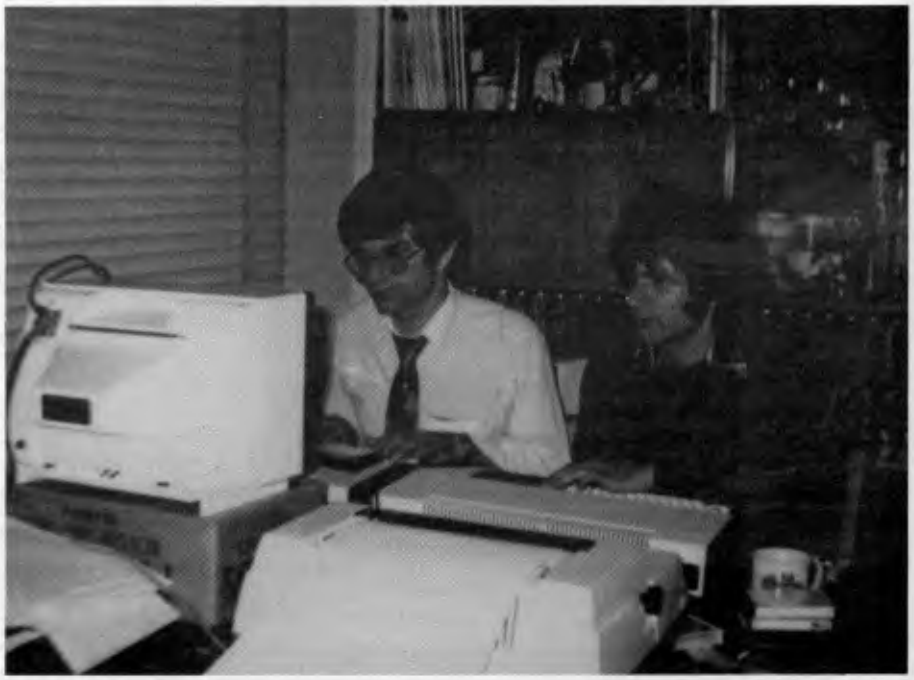
As the copyright issue rears its ugly head yet again, it's not surprising that many software vendors are feeling a little uncomfortable over the future of their industry.

In 1982, Computer Cognition released a number of eductional programs for the Apple II including Maths Invaders. Like many other software houses, we chose to take the piracy problem into our own hands by incorporating protection schemes into our programs, making copying extremely difficult.

Evidence suggested that schools, our main target, were not guiltless in the area of software piracy. In fact we were warned by major computer retailers that this market was the least financially rewarding. One reason for schools' pirating software is the feeling that good educational software is too expensive to buy.

At the time, we argued that we had a fundamental right to protect our investment in time and money, and that supplying a single backup and replacement service sufficiently protected the rights of the purchaser.

However, in protecting our own interests, we neglected the purchasers' moral right to protect or modify their own investment. We have now taken a step in the opposite direction to the rest of the industry, and placed trust in the teaching profession.



Mark and Greg Simon working at the computers

With our new releases of the Maths Invaders family of programs, we have removed all copy protection. This enables the legitimate user to make back-ups easily. Other programs written specifically for Computer Cognition are also being unlocked.

Even though this may result in an increase in the number of pirated copies of this software, we believe that the rights of the legitimate purchaser are of more concern than the misdeeds of thieves.

Our policy of allowing the purchaser to make legitimate back-ups is based on our belief that teachers are professionals whose main concern is that their students have the advantage of good educational software.

We have made our software available at a price which makes piracy unnecessary.

We welcome any comments about either our views or software. We may be contacted by writing to PO 2164, Nth Parramatta, 2151.

Textbooks of the Future

Control Data and Pitman Publishing join forces

Two of Australia's 'leading edge' publishing houses — one of the oldest and one of the newest — have joined forces to bring 21st century technology to the Australian classroom.

Control Data Publishing, an education service of Control Data Australia, has appointed Pitman Publishing, incorporating Pitman Education Services, as national distributor of its computer based education courseware.

Control Data Publishing, officially launched in Australia only in June, is bringing to the Australian Education market a vast range of microcomputer based courses which are compatible with primary, secondary and tertiary education curricula throughout the country.

The majority of the courses currently available cover mathematics, arithmetic, science, languages, and fine arts, at all levels, but there is a wide range of other 'miscellaneous' courses also on offer.

Pitman, traditionally prominent in the book publishing area in Australia, has

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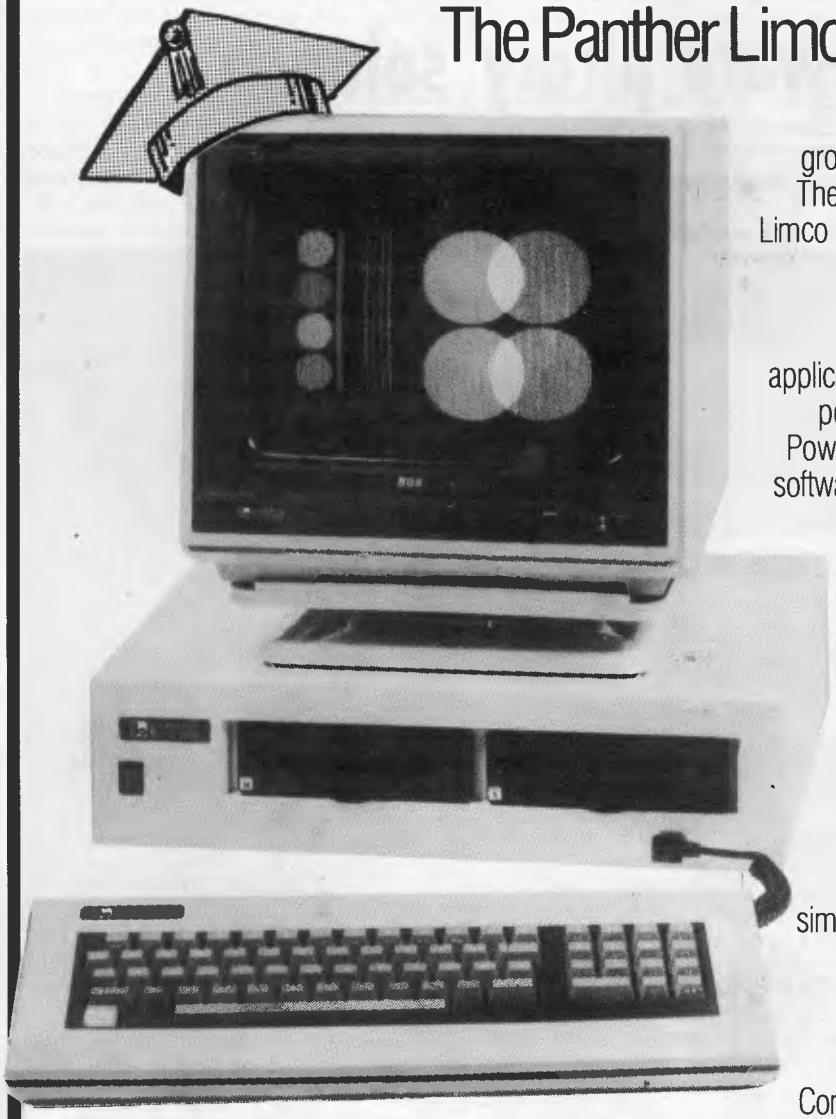

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The agreement with Control Data Publishing, to distribute Control Data's own Plato Courseware as well as courses from a number of other leading US authors and producers including the Minnesota Education Computing Consortium (MECC), Krell and Cosine, will mean another major expansion of Pitman's Publishing and distribution activities in Australia.

The Courseware, in a sense, is the text book of the future — instead of a book full of written pages, the courses come in the form of one or more disks together with a student's manual. The disks can be bought to run on a variety of the more popular Australian micros, including IBM PC, Apple, Commodore and Atari.

According to Mr Paul Reekie of Pitman Publishing, Pitman sees the form of computer-based training which they will bring to Australian education as a significant vehicle for the delivery of all forms of education in the future.

Mr Greg Phillips, Control Data's manager of education services, said the association of Pitman Publishing and Control Data would bring Australian students the best of both worlds — the most modern methods of computer based study through established and well-respected publishing channels.

All singing, all dancing IBM Travelling Schools Computer literacy project.

Sugar-coating a difficult area: That's how the Command Performances' Theatre group sees their computer literacy for schools programme.

The IBM Star Wars Computer Education Show is a travelling technology show now visiting schools throughout the Sydney metropolitan area.

IBM's sponsorship for the initial 12 month pilot of the show is $700,000 which includes the loan of 45 IBM PCs.

The first part is an exhibition of computers demonstrating robotics, voice synthesis, video control and graphics. Next is a display of 40 IBM Personal Computers programmed to allow the audience to experiment. The third part of the show is a small theatre.

The stage is a giant simulated IBM Personal Computer and the goodies, two 21st century school kids — Sil and Con (read Silicon) — switch, boot, sing and dance their way to computer literacy.

En route they do battle with Darth Vader who they accidentally call up on the giant PC and who's intent on gathering all computer knowledge on earth and taking it to "The Force". Fortunately Sil and Con, with the help of a rap-dancing Ewok, are able to backspace Darth Vader into orbit and save the day.

The Star Wars Show, currently doing the New South Wales schools circuit and Command Performances, hopes to reach 250,000 people in the first year. Some 4,000 school children will see the show per week, with another 1,000 adults expected to visit the dome with their children in the evenings. Parents pay $2.50 to $5.00 for their child's attendance. A teachers sourcebook and childrens' worksheets are provided.

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keystrokes. The simplest form of macro could imitate a series of often used keystrokes or return an often used string.

In addition Symphony has what it calls the Symphony Command Language. This extends the abilities of macros by allowing FOR . . , NEXT loops, IF . . . THEN structures, subroutines, error trapping, and so on. Although this extends the programmability of Symphony, it doesn't come near Framework's FRED in terms of sophistication.

Database

Symphony's method of operation is to store information in spreadsheet format, with each data item occupying a single cell, each field a column, and each record a row.

This approach gives a number of distinct advantages — among which are high-speed retrieval of information and flexibility in viewing the information as individual records, as a table or mixed with text.

In addition, all the 'housekeeping' information, such as the format of the screen used to display individual records, the criteria which may be needed to select subsets of records, and so on, are also stored in the same worksheet as the data, which also speeds up operation, and makes it possible to change such administrative details quickly.

However, the corresponding disadvantage is that you are limited as to the amount of information you can store. These limits apply to any kind of information held by Symphony, but are more likely to prove a serious drawback in processing structured data considered as batches of records than in other applications.

Symphony takes up approximately 290k characters, so on the minimum size memory on which it will run you would only have room for about 30,000 characters, or about 150 records of 200 characters each. The maximum amount of memory you can have on a standard IBM PC is 640k characters, giving you a maximum of 350,000 characters of working space, or, theoretically, about 1750 records of 200 characters each. In practice, the limit would be rather lower, since the 'housekeeping' information seems to take up quite a lot of room. My Benchmark file contains 1000 records each of 152 characters; in Symphony, these records, together with the screen format, record definition, three selection criteria and a sort criterion took up about 220,000 characters, and was in fact nudging against the memory limit on a 512k machine.

Record creation

To use Symphony for data management, the minimum necessary is to set up a list of field names, and then ask Symphony to generate a set of definitions and a screen entry format. This format can then be used in FORM mode to add, amend or display individual records, one record occupying the whole screen. If you work this way, Symphony sets up all fields with the same data type and length. Alternatively, you can specify these attributes yourself. The field names are also used as column headings when the data is viewed as a table in spreadsheet mode. A Calc field type is allowed, which permits data values to be calculated from other fields or constants or both. Good data validation features are provided.

To enter records in FORM mode, you simply type them in. You can also enter records in SHEET mode, but if you do you must also amend the separate set of data set definitions to tell Symphony that that total number of records has changed. In either case, you can use the usual cursor controls to move about.

Once a record has been inserted, to amend it you must recall it to the screen and use the Edit key (a function key) to show that you wish to make changes. When amending records, you can set selection criteria to allow retrieval of a particular subset that needs changing. Since the whole of the data is held in memory, with a coordinate reference for each data item, the effect is that each field is indexed for direct access. As a result, access times of individual records are very fast — see the timings for Benchmarks 2 to 5; such times would apply to any field without an intervening indexing step, hence the absence of BM6 which is irrelevant in the Symphony context.

In SHEET mode, you can amend fields across the whole data set or across ranges, using the spreadsheet recalculation facilities; this was the approach used to carry out BM8.

Displaying and printing information

Individual records can be displayed using the form designed for input, or displayed or printed in formatted reports by designing a format using a 'paint-a-screen' approach within the worksheet. Such formats may include multi-line formats suitable for mailing labels.

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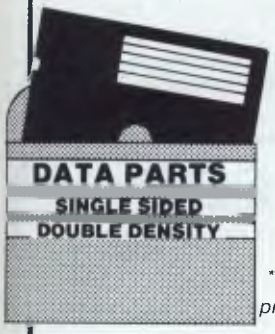

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stored in a separate file for use in different worksheets if desired, or to save space in the worksheet. A default print format is also provided, using the field names as column headings. Data from individual records can also be processed via documents such as standard letters created in DOC mode; the 'template' letter looks very much like the corresponding document in WordStar's Mailmerge facility. However, the standard letter must reside in memory with the data while the two are being merged, so this would also reduce the space for records.

Calculations for analysis are very powerful, as you would expect on a spreadsheet-based package, and include a variety of statistical functions as well as totals. By using these features carefully you can also calculate subtotals.

Selection and sorting

You can set up selection criteria to display particular sets of records in FORM mode. Each criterion may contain one or more tests, and a record must pass all the tests to be selected. You may have several criteria in operation together, and in this case the record must pass any one criterion.

Using this combination, you can set up most combinations of AND and OR; the operators provided are the usual comparison operators for both numbers and character strings, and there are also a good range of special string operators such as LEFT. You can ask for searches to start at a particular point in the string, and for partial matches using wild codes.

While in SHEET mode, you can also restrict your view of the data table. This is done either by setting up search criteria to select particular records, in which case all records are displayed but those matching your criteria are highlighted, or by constructing windows to restrict your view to a particular rectangular range or ranges.

Advanced features

You can link information in two or more separate sets of data, but only where they are all contained in the same worksheet and reside in memory at the same time, thus encountering memory limits. A good macro facility is provided, so you could construct tailor-made applications if these were appropriate. It is possible to run DOS commands directly from within Symphony, and this, combined with the fact that all your data is held in memory, makes it possible to recover cleanly from a 'disk full' error when saving the worksheet — a distinct advantage!

Spreadsheet

To start using Symphony as a spreadsheet the 'services' menu must be activated. Symphony always has two menus on hand: 'services' is for general operations relevant in all contexts, and 'applications' is tailored to the needs of the particular type of window in use.

The services menu includes options for creating all types of window, and so for spreadsheeting the spreadsheet window must be specified. A name must be given to the window, and its display position and size defined. Several windows of differing types can appear onscreen simultaneously, and Symphony provides a number of facilities for organising this layout.

As Symphony provides only one place for storing everything, it is not surprising that it is very large. And any unrestricted spreadsheet window has unrestricted access to the whole of it. The spreadsheet is 256 columns across by 8192 rows down.

Of course, even though both Symphony and Framework operate on IBM PCs with identical keyboards, most of the keystrokes are different. Some of

Symphony's cursor moves involved two keystrokes, but were slightly easier to remember. For example, pressing the 'END' key, then the 'right-arrow' key moves the cursor to the right-hand of a row, whereas 'END' plus 'down-arrow' moves to the bottom of a column, and so on.

Like Framework, Symphony offers a rich variety of functions to be used in building up models. On a casual inspection it looks like Ashton-Tate's and Lotus's programmers picked up the same functional spec. But there are a few differences. Symphony does not have the same maze of date functions (a good point), but generally elsewhere it does have one or two bonus functions not found in Framework. On a close inspection, Symphony can offer: @ROUND, @RAND, @ISNUMBER and a few other minor functions which have no counterpart in Framework.

There is one unfortunate aspect to Symphony's management of the spreadsheet, illustrated by the fact that it is impossible to use the top-left and bottom-right cells together. Even if nothing else exists anywhere the system gives an 'insufficient memory' error. This extreme example is unlikely to trouble most users, but it does point to inefficiencies in Symphony memory-management.

When in spreadsheet mode the applications menu keystroke accesses the Sheet menu. This menu is tailored to the needs of spreadsheeters. It is this, coupled with the distinctive spreadsheet display and differing action of the cursor keystrokes, that distinguishes Symphony spreadsheet mode from other possible modes. The sheet menu offers 11 different 'commands' to facilitate manipulations to the spreadsheet, such as Move, Copy, Delete and Insert.

Symphony has a fairly unusual spreadsheet command called a 'range-command'. The basic idea is that a rectangle of cells (a 'range') can be given a name, and this name can be used in subsequent operations in place of the range coordinates. This has a surprisingly large number of uses: ranges can be filled with numbers, be protected from accidental erasure and act as the source for distribution counts.

In common with 1-2-3, Symphony spreadsheet also has a database facility. This is, of course, in addition to the main Form window, which offers rather more database functionality. It is possible to sort records, and there are also some special database functions available for use in formulae. These apply descriptive statistical operations to selected records only. They are all duplicated by non-database equivalents that work exhaustively down a column.

(Database enthusiasts would be better advised to work through a Form window, but presumably Lotus has included the database commands in the spreadsheet window primarily for the benefit of 1-2-3ers who have opted for Lotus's upgrade to Symphony.)

From a spreadsheet window, data in other applications can be readily accessed. Since all types of window actually store their data in the spreadsheet this is particularly simple, and the data can be referenced in the normal way.

An interesting feature of Symphony, which is not permitted in Framework, is the ability to change the type of a window. Some type changes are of limited value, although it can be instructive to change to spreadsheet from one of the other types, just to see how Symphony structures the underlying information. In the middle of a word processing session it is possible to change the type to spreadsheet, enter a formula into a cell alongside the text and the word processor document will have an embedded reference to information elsewhere in the spreadsheet, automatically updated in the normal way by spreadsheet recalculations. No damage is done by changing type. As soon as the orginal type is restored, the display reverts to what it was previously. If a document has an embedded formula only the result is displayed, and it cannot be edited without revertingto spreadsheet type.

Lotus has pre-empted the software-tutorial vendors by supplying Symphony with its own tutorial software.This is organised as a series of lessons, designed to take the novice through the basics of Symphony spreadsheeting.

On the subject of teaching — not only can Symphony teach you, but you can also teach it! This is called Symphony's 'learn' mode, where every keystroke in a sequence is remembered so that it can be re-executed later. This is useful for any situation where you might be repeatedly performing the same sequence of operations a number of times, but is particularly appealing to the more mathematically-minded spreadsheet user.

Once the system has done some learning it is fairly instructive to see

Database summary

	Framework	Symphony
Max file size	ML	ML/8191 recs
Max record size	ML	256 x 240 chrs
Max no fields	ML	256
Max field size	ML	240
Max digits	NA	15
Max prime key length	NA	240
Special disk format?	No	No
File size fixed?	No	No
Link to ASCII files?	YV	YV
Data types	C,N	C,N,D,T,M,
Fixed record structure?	Yes	Yes
Fixed record length stored?	Yes	Yes
Amend record structure?	Yes	Yes
Link data files?	NA	Y*
No. data files open	NA	ML
No. sort fields	UL	3
No. keys	NA	ML
Max key length	NA	ML
Subsidiary indexes kept up-to-date?	NA	NA
Data validation	Adequate	G
Screen formatting	P,D	P,D
Unique keys	NA	Optional
Report formatting	P,D	P,D
Store calculated data	IN,BA	IN,BA
Totals & Statistics	Yes	Yes
Store selection criteria	No	Must
Combining criteria—And,Or,Not—>1 criterion field	Yes	Yes
Wild code selection?	SW	AF
Browsing methods	AF	SW
Interaction methods	—Menu,	Full Tailoring—
Reference Manual+	PR	**
Tutorial Guide+	PR	***
Reference Card+	PR	?
On-Line help+	****	?
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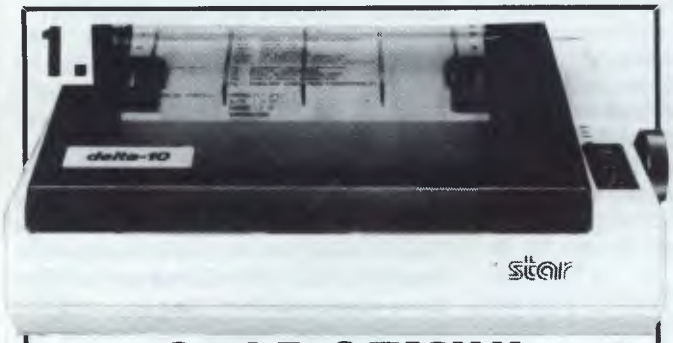

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how the keystrokes information has been stored which serves as an introduction to Symphony's macro facility. The information on the keystrokes is stored as text, in a column and might look like this:

```
123.456~
{RIGHT}
666.789~
+a36 * b36
/c{UP}~{RIGHT}{UP}
```

Symphony does not store the keyboard codes of the characters, but gives them readable names like {RIGHT} for the right arrow key and '~' for the RETURN key. The example above shows that everything you do at the keyboard can be noted in learn mode: numeric and formula entry, cursor movement, and menu selections. (The '/' key activates the menu.)

The macro language includes a number of other features, which cannot be entered by 'learning' at the keyboard. For example there is {IF} and {WHILE} which can be used just like IF and WHILE in any other programming language. To work fully with Symphony's macros, it is easiest to open a document window and use the normal word processing facilities to create the program. Like anything else the document is stored in Symphony's spreadsheet, so it is perfectly usable from a spreadsheet window.

Conclusion

Framework and Symphony integrate the same five applications, cost about the same and will be launched within a few weeks of each other. They both come with huge volumes of documentation which were, unfortunately, incomplete at press time.

On the database front, for applications which involve a good mixture of database and spreadsheet work and where the amount of data involved is not large, Symphony is invaluable.

But limitation to computer memory space also applies to Framework. However, the ability to use it in conjunction with dBasell and to extract subsets of dBase files directly should make Framework a useful package as a complement to dBasell for users of large data files.

Symphony's spreadsheet calculations are decidedly faster than those of Framework's. Ashton-Tate claims that Framework's spreadsheet can be used for accounts ledgers, cash flow analysis, job cost estimates and budget preparations, yet it's worth questioning how easy it would be to implement this sort of project.

Ashton-Tate obviously hopes to stimulate independent software houses to develop applications within the Framework environment with FRED, and it would be a worthy feat indeed for such software to compete successfully with some of today's specialist accounting packages.

Writing in Symphony's macro language is also for advanced users, but once a specialised application has been implemented as a macro, the system could be operated by a relatively unsophisticated user. Nevertheless, if you intend building complex structured spreadsheet models Framework's frames are definitely easier to handle.

As word processors both packages perform adequately. Users probably shouldn't choose either package on the strength of word processor requirements alone. As well as producing integrated reports the word processing facilities offered are suitable for memos and documents.

Framework is the more 'powerful' of the two overall, but much of this power is inaccessible to all but the most enthusiastic user. It's no cop-out to say that neither product stood out as being visibly superior.

Both products get a big thumbs-down on size of documentation. Certainly the main thrust of both packages is firmly towards the business user who doesn't want the hassle of learning to use a number of different packages. On balance, both packages are probably easier to use than the more traditional 'integrated' approach of a package such as Open Access.

Framework will cost about $795 or about $225 to upgrade from dBase II. Symphony will cost $995 or $300 to update from Lotus 1-2-3. END

Symphony Database Benchmarks

(*Framework's* Benchmarks will be published as soon as Ashton-Tate releases a production version of the package)

BM1	Time to add one new record	Inst
BM2	Time to select record by primary key	Inst
BM3	Time to select record by secondary key	3 secs/Inst
BM4	Time to access 20 records from 1000 sequentially on 3-character field (same field as in BM2 key)	A
BM5	Time to access record using wild code	3 secs/Inst
BM6	Time to index 1000 records on 3-character field	NA
BM7	Time to sort 1000 records on 5-character field	1 min 10 secs
BM8	Time to calculate one field per record and store result in record	12 secs
BM9	Time to total three fields over 1000 records	5 secs
BM10	Time to add one new field to each of 1000 records	3 secs

Time to import a file of 1000 records: 2 mins 5 secs

Spreadsheet Benchmarks

Both systems were prototypes, not the final release version, and were tested on IBM PCs

Framework

The prototype *Framework* software occupies 210k of RAM, but the released version will be cut to 150k (plus a 60k 'overlay'). If this goes according to plan it will be feasible to run small *Framework* applications in just 256k of RAM. This will undercut the minimum *Symphony* memory requirement by 64k.

These tests were made on an IBM PC with 512k of RAM. Although *Framework* can use the 8087 numeric processor chip to enhance calculation speeds this was not available in the test machine. It was not possible to test the spreadsheet capacity (Benchmarks 1(a), 2 and 3) owing to a software malfunction when large spreadsheet frames were created. The remaining tests were performed on a 100 row by 13 column spreadsheet.

1 (b) and (c) Integer and decimal recalculation time: 48 seconds; that is 2.08 rows per second.

1 (d) Horizontal scrolling: 6 seconds; that is 2.16 columns per second.

1 (e) Vertical scrolling: 63 seconds; that is 1.59 rows per second.

Symphony

These tests were made on an IBM PC with 485k of RAM. 310k of this was occupied by the software, leaving 148k for spreadsheet data.

(1) (a) Number of rows accommodated: 247.

(1) (b) and (c) Integer and decimal recalculation time: 33 seconds; that is 48 rows per second.

(1) (d) Horizontal scrolling: 7 seconds; that is 1.86 columns per second.

(1) (e) Vertical scrolling: 68 seconds; that is 3.63. rows per second.

(2) Number of rows of text accomodated: 820.

(3) Number of rows of numbers accommodated: 967.

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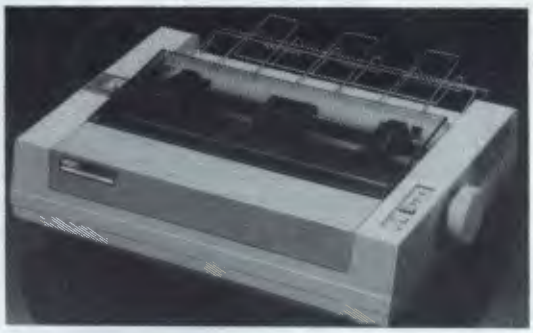

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This is our unique quick-reference guide, reprinted every month, to help our readers pick their way through the most important pieces of (necessary) jargon found in APC. While it's in no way totally comprehensive, we trust you'll find it a useful introduction. Happy microcomputing!

Probably the first thing you noticed on picking up this magazine for the first time was the enormous amount of unintelligible-looking jargon. In the words of *The Hitch-hiker's Guide to the Galaxy:* Don't panic! Baffling as it may sound, the jargon does actually serve a useful purpose. It's a lot easier to say VDU, for example, than 'the screen on which the computer's output is displayed.' This guide is intended to help you find your way around some of the more common 'buzzwords' you're likely to come across in the pages of *APC.*

For those completely new to computing, let's start with the question: What is a microcomputer? We can think of a micro as: a general-purpose device in contrast to a typewriter, which can only be used for typing; a calculator, for performing calculations; a filing cabinet, for filing information, to name just a few of its functions. A micro can do all these things and more.

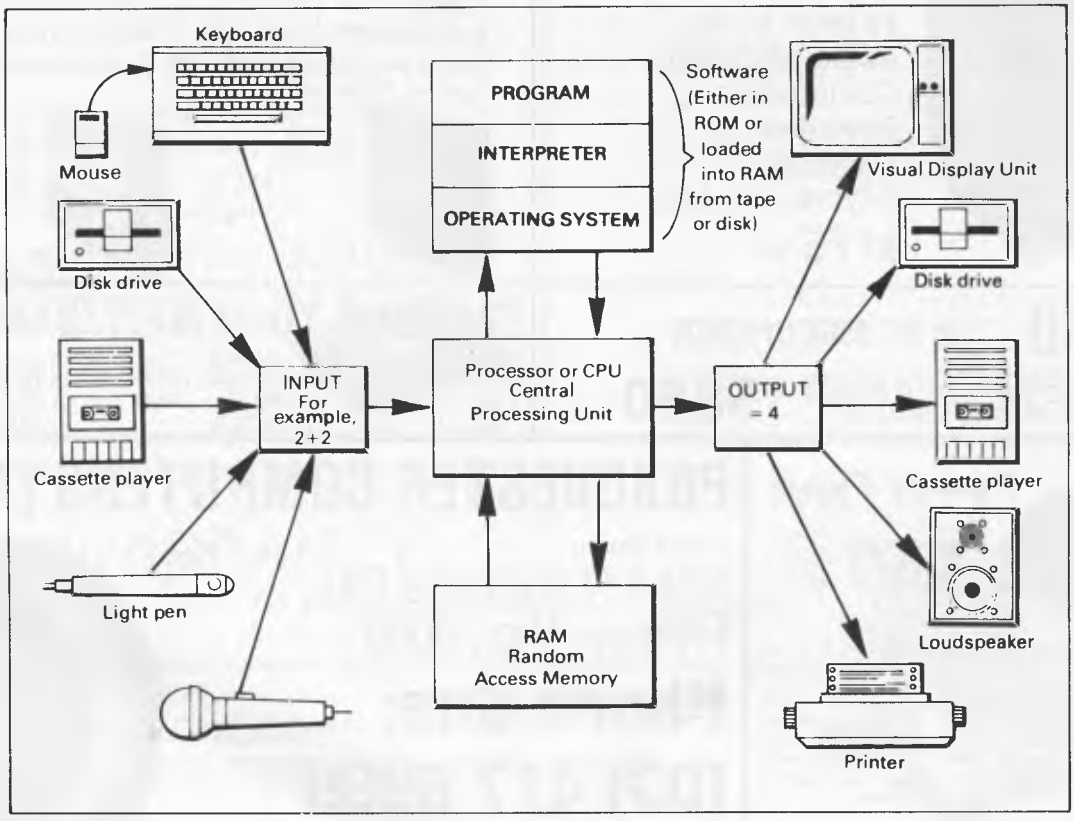
If it's to be of any use, a general-purpose device needs some way of knowing what to do. We do this by giving the computer a set of logical instructions called a *program.* The general term for computer programs is *software.* Every other part of a microcomputer system is known as *hardware:* 'If you can touch it, it's hardware.'

Programming

Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a *code* known as a *computer language.* There are literally hundreds of different languages around, the most popular of these being *Basic.* Basic is an acronym of *B*eginners' *A*ll-purpose *S*ymbolic *I*nstruction *C*ode. Although originally intended as a simple introductory language, Basic is now a powerful and widely used language in its own right.

Other languages you're likely to come across in *APC* are *Forth, Pascal, Logo, C* and *Comal* to name but a few. These are known as *high level* languages because they approach the sophistication of a human language. You'll also see references in *APC* to the *low level* languages, *assembly language* and *machine code.* We'll look at these in a moment.

The heart of a micro, the workhorse, is the *processor* or *C*entral *P*rocessing *U*nit *(CPU).* The processor usually consists of a single silicon chip. As with computer languages, there are a number of different types of processor available, *Z80, 6502, 6800* and *8088* being just a handful (literally) of the types in common use. The processor is nothing magical — it's just a bunch of electronic circuits. It's definitely not a 'brain'.



A schematic view of a microcomputer system

As it's electronic, the processor's circuitry can be in one of two states: on or off. We represent these two states by *binary* (base two) notation, the two binary digits (known as *'bits'*) being 0 and 1. It's possible to program computers in binary notation, otherwise known as machine code (or machine language) programming.

Machine code is called a low level language because it operates at a level close to that 'understood' by the processor. Languages like Basic are known as high level languages because they are symbolic, operating at a level easily understood by people but not directly understood by the processor.

Between high level languages and machine code is a low level language known as assembly language or, colloquially, *assembler*. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

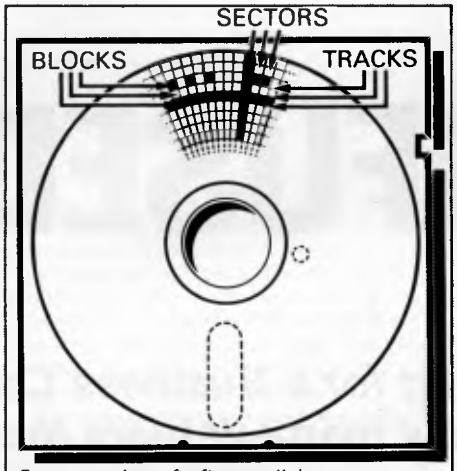
Since everything has to be converted into binary form before the processor can make sense of it, we need some sort of code to represent each character to be processed by the computer. In order to simplify communication between computers, a number of standard codes have been agreed on. The most widely used of these codes is the American Standard Code for Information Interchange, *ASCII*. This system assigns each character a decimal number which the processor can then convert to its binary equivalent.

A program written in a high level language must be converted into binary before the processor can carry out its instructions. We could of course do this manually, but since this is exactly the sort of tedious job computers were designed to do for us, it makes much more sense to write a program to do it.

There are two types of program to do this translation for us.

The first of these is a *compiler* which translates our whole program permanently into machine code. When we *compile* a program, the original high level language version is called the *source code* while the compiled copy is called the *object code*. Compiled programs are fast to run but hard to edit. If we want to change a compiled program, we either have to edit it in machine code (extremely difficult) or we have to go back to a copy of the source code. For this reason there is a second translation program: an *interpreter*. An interpreter waits until we actually *run* (use) the program, then translates one line at a time into machine code — leaving the program in its original high level language. This makes it slower to run than a compiled program, but easier to edit.

There are two unusual Basic words you're likely to come across: *POKE* and *PEEK*. When you program in a high level language, you are normally unable to choose in which part of the machine's memory the processor will store things. This makes programming easier as you don't need to worry about memory locations, but slows down the program since the processor has to 'look up' addresses for you. Using the POKE command, however, you can 'poke' a value directly into a desired memory address. 'POKE 10000,56', for example, puts the value 56 into memory location 10000. PEEK allows you to examine the content of a particular memory address. If you were to follow the above poke with 'PEEK (10000)', the computer would respond by displaying the value 56. POKEing and PEEKing is normally done to increase program speed, but may also allow us to do things which could not be done through Basic.



Cross-section of a floppy disk

Memory

So far, we have a processor and a program. Since a computer needs somewhere to store programs and data, it needs some kind of *memory*. There are two types of memory: *Read Only Memory (ROM)* and the badly named *Random Access Memory (RAM)*. ROM is so-called because the processor can 'read' (get things out of) its contents, but is unable to 'write to' (put things in) it.

ROM is used to store *firmware*, the name given to software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

RAM differs from ROM in two important ways. Firstly, you can write to it as well as read from it. This means that the processor can use it to store both the program it is running and *data* (information). The second important difference is that RAM needs a constant power supply to retain its contents: as soon as you switch the computer off, you lose your program and data.

There is a type of RAM, known as *CMOS RAM*, which requires only a tiny amount of power to retain its contents. This is found in portable computers like the Tandy 100. It is usually powered by small ni-cad batteries so that programs and data are retained even when the main power is switched off. At present, CMOS RAM is extremely expensive and is not likely to be used in desktop machines for a little while yet. (CMOS stands for Complementary Metal Oxide Semiconductor).

Memory is described in terms of the number of characters we can store in it. Each character is represented by an 8 bit binary number. 8 bits make one *byte* and 1024 bytes make one *Kilobyte* or *1k*. 32k, for example, means that the computer can store about 32000 characters in its memory. If 1024 sounds like an odd number, remember that everything is based on the binary system, thus 1,2,4,8,16 . . . 1024 being the nearest binary multiple to 1000.

While we're on the subject of bits, you'll often see computers and their processors described in terms of their *bit power: 8-bit, 16-bit, 32: 16-bit* and so on. This is a means of describing how large a binary number the processor can handle in one chunk. A binary number, incidentally, is known — confusingly — as a *word*. An 8-bit processor, for example, can handle 8-bit words, that is, up to 11111111 (255 in decimal). Anything larger than this has to be broken down into manageable chunks before it can be processed.

A 16-bit machine can handle bigger chunks of data at a time. This means it can handle (*'address'*) larger amounts of memory at one time. This is why most 8-bit machines have a maximum of 64k RAM while 16-bit micros usually have 128k upwards.

As 16-bit processors can handle larger words than an 8-bit machine, they ought to be twice as fast. In practice, however, there is a little more to it than that. While it may take a 16-bit machine half as long to work out that 2+2=4, the actual processing is only part of the story.

The result of the calculation has to be placed into the appropriate memory location, passed to the screen or whatever is required. The transfers to and from the processor are often made in 8-bit form; this is why you'll hear people arguing that certain processors are not 'true' 16-bit. If the problem has to be handed to the processor in 8-bit form, turned into 16-bit, calculated and then the result turned back into 8-bit for transfer elsewhere, there may be little or no saving in time over an 8-bit system.

The other factor affecting speed is that the actual processing may form only a small part of the overall operation. A word processor, for example, spends most of its time passing files to and from disk and waiting for the user to type the next character. The processing itself consumes very little time. And if you look at the Benchmarks summary (*APC*, February 1984, pp 59-60), you'll see some 8-bit machines beating their 16-bit rivals — even in processor-bound operations like the *APC* Benchmarks.

Returning to the subject of RAM for a moment, a word of warning: Don't rush out with your new-found understanding to buy the machine offering you the most RAM for your money. Quite aside from the fact that the amount of RAM is by no means the only consideration when buying a micro (no matter how much manufacturers may stress it), different machines use differing amounts of RAM for things like graphics. Always check how much RAM is actually available to the user for program storage. Machines which proudly proclaim '64k' may well leave you with less than half of this in which to store Basic programs and data.

Back-up storage

There are numerous forms of *permament* or *back up storage*, but by far the most common are *floppy disk*, *floppy tape* and *cassette*.

Floppy disks or diskettes are circular pieces of thin plastic coated with a magnetic recording surface similar to that of tapes. The disk, which is enclosed in a protective card cover, is placed in a *disk drive*. Disk drives comprise a high-speed motor to rotate the disk and a

NEWCOMERS START HERE

read/write head to record and 'play back' programs and data.

The disk is divided into concentric rings called *tracks* (similar to the tracks on an LP) which are in turn divided into small *blocks* by spoke-like divisions called *sectors*.

There are two methods for dividing the disk into sectors. One method is called *hard sectoring*, where holes punched in the disk mark the sectors, and the other is *soft sectoring* where the sectors are marked magnetically. The reason that disks from one machine can't be read by a different make is that each manufacturer has its own way of dividing up the disk. Recently, however, manufacturers have apparently begun to acknowledge that this situation can't go on forever, and they are working on making their disks compatible.

Since the computer needs some way of organising the disk, we have a program called a *Disk Operating System (DOS)*, usually known simply as the *Operating System (OS)*. The operating system does all the 'housekeeping' of the disks, working out where to put things, letting the user know what is on the disk, copying from one disk to another and so on. As you might expect by now, there are lots of different operating systems available, each with its own advantages and disadvantages. The three most popular OSs are *CP/M* (*C*ontrol *P*rogram for *M*icros), *MS-DOS* (*M*icro*S*oft *D*isk *O*perating *S*ystem) and *PC-DOS* (*P*ersonal *C*omputer *D*isk *O*perating *S*ystem). MS-DOS and PC-DOS, incidentally, are all but identical.

Disks can support what are known as *random access files*. That is, you can randomly choose a point in a file and the drive head will move directly to that point. You can then edit the file, and only the blocks affected will be rewritten. The rest of the file remains unchanged.

Floppy disks provide a reasonably fast and efficient form of secondary storage and are cost-effective for business machines. For home computers, however, the usual form of program and data storage is on ordinary cassette tape using a standard cassette recorder. This method of storage is slow and unreliable, but is very cheap and adequate for games, for example.

Cassettes can support only *serial access files*. That is, whenever a file is to be edited, the whole file must be written back to the tape. This makes certain applications — word processing being a prime example — extremely tedious.

Floppy tape drives are a compromise between speed and cost. They use a small continuous loop tape which, like a disk, is divided into blocks. Floppy tape drives rely on serial access files, but by rotating the tape at high speed and using the block markers, they can simulate random access files.

Another type of disk you'll see referred to is the *hard disk*. This is an extremely efficient method of storing large amounts of data. Hard disk capacity generally starts at around 10 *Mbytes* (10 million bytes) and rises to . . . well, you name it. Besides offering a much greater capacity than floppies, hard disks are more reliable and considerably faster. They are, however, much more expensive than floppy drives.

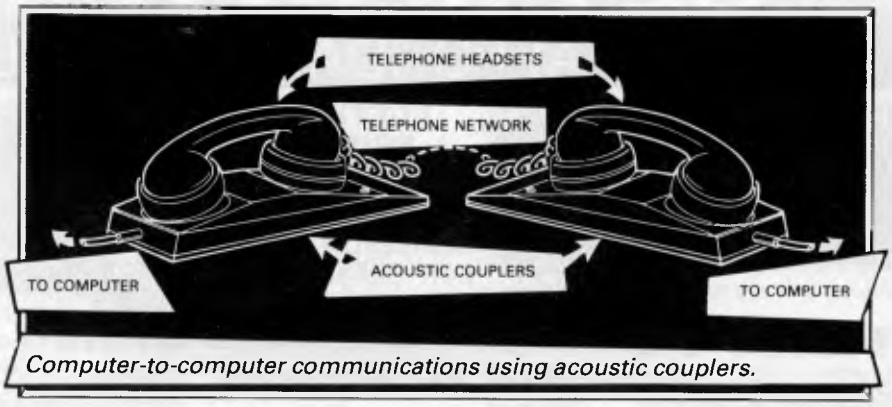
Input/output

Since computers need some way of communicating with the outside world, we need *input* and *output* devices. Input and output devices include all manner of things from hard disk units to light pens, but the minimum requirement for most applications is a typewriter-style *keyboard* for input and a TV-like *Visual Display Unit* for output. The Visual Display Unit is variously referred to as a *VDU*, *Cathode Ray Tube (CRT)* and monitor.

The various component parts of a computer system (processor, keyboard, VDU, disk drives, and so on, may all be built into a single unit or they may be separate, connected by cables.

Take this paragraph slowly and it will make sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — *parallel* or *serial*. Parallel *input/output (I/O)* requires a number of parallel wires. Each wire carries one bit, so with eight wires we can transmit/receive information one byte at a time (8 bits = one byte, remember). Serial I/O, in contrast, uses a single wire to transmit a series of bits one at a time (that's why it's called serial), with extra bits to mark the beginning and end of each byte.

To enable different devices to communicate with each other in this way, standards have been agreed for different *interfaces*. An interface is simply a piece of circuitry used to connect two or more devices. The most common standard serial interface is the *RS232* (or *V24*) while the Centronics standard is popular for parallel interfaces.



Computer-to-computer communications using acoustic couplers.

Networks

When two computers want to communicate with each other over a distance, there are again two ways of doing it (nothing is ever clear-cut in the world of micros — you'll get used to it). Both methods use the public phone network. The first is known as an *acoustic coupler*. This simply plugs into your computer, and has a receptacle into which you place your telephone handset. The acoustic coupler is convenient in that you can unplug it from one computer and plug it into another one in a matter of seconds. They are generally slow, however, and prone to interference.

The alternative method is to use a *modem*. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from Telecom.

A term you'll hear used in connection with acoustic couplers and modems is *baud rate*. The baud rate is a measure of the speed at which a device can transmit and receive data. You can safely think of the baud rate as being bits-per-second, though the accurate definition is a little more complex. Therefore, a 300-baud modem can transmit/receive data at the rate of 300 bits (about 50 characters) per second.

A 1200/75 modem means that it receives at 1200 baud but transmits at 75. Most modems are 1200/75 and acoustic couplers 300/300. By way of comparison, saving programs to cassette is normally done at between 300 and 1500 baud.

Finally, communications between computers is either *full* or *half duplex*. Full duplex is when the machine receiving the data echoes it back to the machine transmitting it and says 'This is what I think you said — is that right?'. If it's wrong, the section will be transmitted again. Half duplex is where no checking is made. If you're ever unsure of which to use, start with full duplex. If everything you type appears on your display twice, then you should switch to half duplex.

Database

A database allows you to store, process and report on structured information. Most of the cheaper packages are based on a traditional card index where each card about an individual, order or item of stock is stored in a single record and a group of like records is stored in a file (corresponding to the index card box). Sophisticated packages can relate several files together, so that you can process groups of dissimilar but related records.

Spreadsheet

Spreadsheet software is useful to anyone who regularly uses a calculator. The VDU acts like a 'window' on a large sheet of numbers — neatly laid out in rows and columns, occasionally interspersed with text headings. The user is able to shift the window to the point of interest and so enter text. The rest of the calculation is displayed immediately with automatic recalculations throughout.

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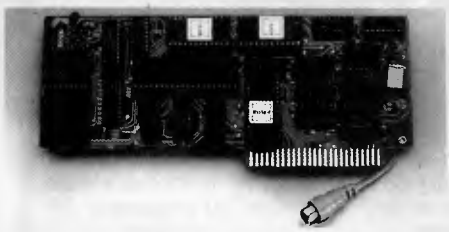

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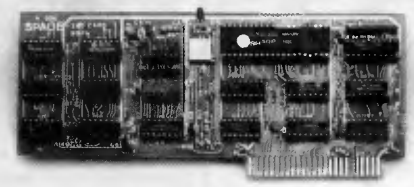

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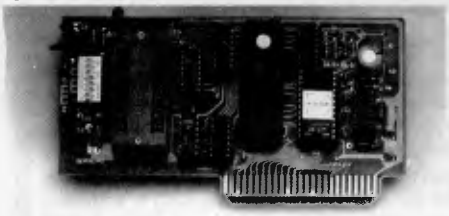

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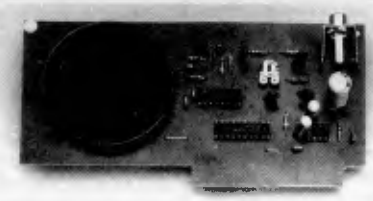

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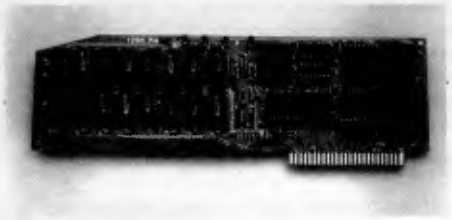

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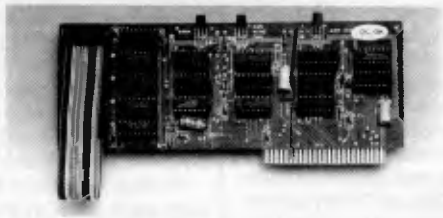

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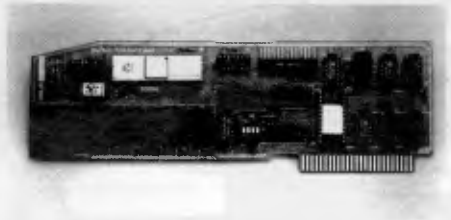

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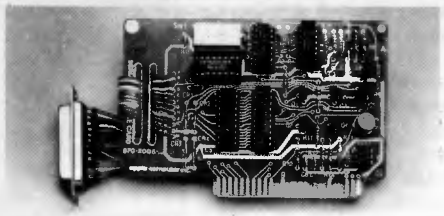

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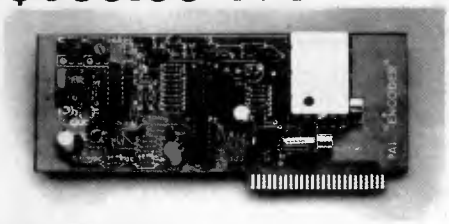

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Tony Harrington is often asked for his advice on chess programming. This month he recommends one chess publication which should be of interest to beginners.

Welcome to Micro Chess

Micro Chess covers all the news and events in the busy world of computer chess. With new chess programs and new chess computers appearing all the time, we evaluate their strengths and weaknesses as they become available. We shall be presenting profiles of programmers, both amateurs and professionals, which will cover their methods and their interest in chess programming, and we shall be talking to suppliers and looking at their plans.

Computer Chess affects computer enthusiasts in two different ways. For some, the fact that they can now play chess against either their home computer or a dedicated chess computer has opened up the delights of the game. For others, the real interest is not so much in playing chess as in trying to build a chess program. Micro Chess aims to meet the interests of both.

Chess is a game that can be as exciting for the beginner as it is for the grand master. So if you haven't played before, get yourself a good introduction to the game — there are dozens in the bookshops — and get to it.

The Chess Computer Handbook (Batsford) written by David Levy is a very good place to begin to understand such abstruse matters as evaluation functions, killer heuristics and the alpha-beta algorithm. (Sorry if these terms put you off the idea of ever taking up chess programming.)

Levy's approach throughout the book is to take the layman firmly, though with some kindness, through the neat logical manoeuvres that make up the received wisdom of chess programming. Not all of what he says is easily grasped. There are mathematics professors who madden their students by saying things like: 'Now it can easily be seen that . . .' when students feel themselves groping about in near total darkness. You might find this text has, on occasion, a similar effect.

This is largely because it is an extremely compact work. The entire subject of chess programming is disposed of in four chapters, totalling 62 pages. The remaining four chapters, which make up the rest of the book's 131 pages, are on topics of general interest, and have titles like 'What to look for in a chess computer', 'How to play against chess programs' and 'How strong can chess computers become?'

The first four chapters are an account of the concepts needed in chess programming; they are not a guide to writing programs in machine code or Basic or anything else. There is not a line of code in the whole book (though Levy reckons that anyone who knows Basic should be able to put the concepts to work without much difficulty.) This absence of code makes it more approachable reading for all those non-programmers who might have wondered how computers can be made to play chess.

This involves two rather different kinds of problem. The first problem, stated by Levy in the opening line of the book, is: How do you tell a computer what chess is? As Levy reminds us: 'It is one thing for a human to gaze at a chessboard, see where the pieces are located and understand the relationships between them, but a computer is merely a device that can store and manipulate numbers.' The answer to this problem takes you into the fundamentals of a chess move generator.

That is the easy bit. The next and far more difficult problem, once the computer can generate chess moves, involves teaching it to recognise worthwhile moves from bad ones. This brings us to the evaluation function. In order for the evaluation function to work well (and computer chess programming still has a long way to go here), all the subtleties of chess have to be reduced to terms the computer can understand — that is, everything has to come down to numbers.

Take the move generator first. To start with, you need a way of telling the computer precisely which piece is on what square. This is achieved by assigning the pieces numbers, positive for white, negative for black. Even in so simple a step there are subtleties to be taken into account. Kings and rooks that have not moved (and which therefore still keep their castling rights) have to be earmarked in some way. Pawns that start with a double move (such as e2-e4) have to be noted so that the *en passant* capture rule can be applied.

This information gives the program all it needs to know about the location and identity of each piece. It still doesn't know what they are. Remember that computers are about numbers. Defining a knight, for example, for a computer is not a pictorial affair. There is no way to tell it that a knight, by historical convention, in the Staunton set, is a horse's head and neck on a pedestal. Tell it all the possible moves a knight can make in any position and you have told it all it needs to know.

Levy explains three ways of generating lists of all the possible legal moves for every piece in any chess position as follows:

(1) Move generation by square offset;
(2) Table driven move generation; and
(3) Incremental updating of move lists.

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If you've never thought about this subject before, you should come away from this section with a fair idea of how all three work.

There are some lovely little gems of logic that chess programmers have come up with in even this rather basic area. But first, for the beginner, here, in summary form, is Levy's account of the first method, move generation by square offset. Assign each of the 64 squares on the chessboard a two-digit number, so:

18	28	38	48	58	68	78	88
17	27	37	47	57	67	77	78
16	26	36	46	56	66	76	86
15	25	35	45	55	65	75	85
14	24	34	44	54	64	74	84
13	23	33	43	53	63	73	83
12	22	32	42	52	62	72	82
11	21	31	41	51	61	71	81

If you place a king on square number 54, the rules of chess allow the king to move to any adjacent square not already occupied by his own pieces or not under direct attack by an opponent's pieces (he may, of course, move onto a square occupied by an opponent's piece — captures by the king are not unheard of in chess . . .). A series of arithmetical operations will generate the addresses of all the squares adjacent to square 54. The same operations will hold good for generating the addresses of legal moves for the king from any square on the board (the border squares excepted, for the moment).

As Levy points out, if you call the square the king is on, square k, then, in general form, the squares it can move to (rules permitting) are:
k−9, k+9, k−1, k+1, k−11, k−10, k+10.

Try it and see. If you do your arithmetic properly you should come up with the squares, 45, 63, 53, 55, 43, 65, 44 and 64.

When you've got this far, and defined the move sequences for all the pieces, you'll have an interesting little problem. What do you do about moves which would take a piece off the edge of the board? It might sound trivial, but try solving it.

The first step is to allocate an 'out of bounds' number to offsets without addresses on the board. A more sophisticated solution is to treat the board as a 10x12 cylinder.

Why 10? — knights can leap two squares off the board before hitting an 'out of bounds' square. Why 12? — because, as Levy puts it: '. . . the file which is two files to the left of the a-file actually occupies the same place in the computer's memory as the file which is two files to the right of the h-file.' Got it?

If you get through the first chapter, you probably have a taste for the joys of logical analysis. In which case, Chapter Two, which tackles the basics of building an evaluation mechanism, will be pure delight. Levy proposes ways of giving numerical weights to such factors as material, mobility, centre control, piece development, king attacks, pawn structures, piece attacks and piece defences.

Chapter Three, 'Tree Searches' tells you enough about minimax to get you started on your own program. It also provides a clear account of why the alpha-beta algorithm can cut down the number of positions a computer needs to evaluate by 99.5% — without the least danger of missing a good move.

The fourth and last chapter on this theme deals with search strategies. How dows the computer know when it can profitably spend time searching a position deeply? How does it decide when to terminate a search? This is well-trodden ground, but fascinating for newcomers.

Although I've concentrated on the conceptual side of the book, there is much of interest in the second, more anecdotal, half. All in all, a neat little volume and a useful book for chess programmers.

Games section

White: David Levy. Black: Cray Blitz. Notes by Dr John Nunn.

I had been favourably impressed by some of the games played by Cray Blitz in the world computer championships and other events, so the result of David Levy's match with this program came as rather a surprise to me. Not that David winning 4-0 was a surprise, but the manner in which he won was. Quite simply David made Cray Blitz look like a very weak club player. He relentlessly exploited all the weaknesses of computer programs, taking the machine out of its opening book at the first chance, never allowing complications to start, and utilising Cray's reluctance to repeat the position to induce inferior moves. It is apparently a very different matter for a program to play against other programs than it is to play against the adaptable mind of a knowledgeable human opponent.

Here is the most interesting game of the match.

★ ★ ★

1	d2-d4	Ng8-f6
	c2-c3	

(An unusual move designed to take Black out of its opening book.)

2	. . .	e7-e6
3	Ng1-f3	c7-c5
4	e2-e3	Bf8-e7
5	Qdl-c2	0-0
6	Bf1-d3	d7-d5
7	Nb1-d2	c5-c4?

(A serious positional error. Black is tempted by the prospect of forcing the bishop to retreat, but he forfeits the pressure against White's centre afforded by the attack of the c5 pawn on the one at d4. Without this pressure White has a completely free hand in the centre. To be fair to Cray Blitz, this type of mistake was often made by top human players in the 1890s, when the problems of central play were not well understood. The correct plan was to exchange White's most dangerous piece, the d3 bishop, by 7 . . . b7-b6 followed by 8 . . . Bc8-a6.

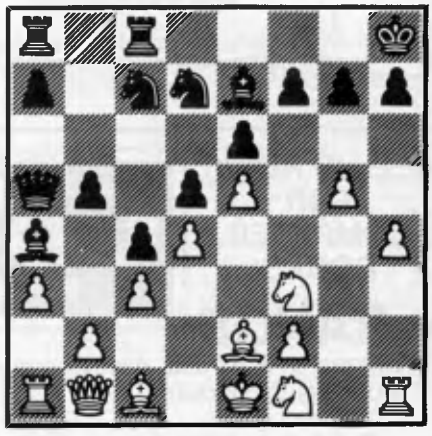
8	Bd3-e2	Qd8-a5?

(Black's only hope for counterplay was to advance his queenside pawns to a5 and b4. On a5 the queen obstructs the execution of this plan.)

9	e3-e4	Bc8-d7
10	e4-e5	Nf6-e8
11	Nd2-f1	Ne8-c7
12	g2-g4	

(It is a matter of personal taste how White conducts the attack. 12 h2-h4 followed by Nf3-g5 might have been even stronger.)

12	. . .	Bd7-a4
13	Qc2-b1	Nb8-d7
14	g4-g5	Rf8-c8
15	h2-h4	b7-b5
16	a2-a3	Kg8-h8



Position after 16 . . . kg8-h8

(Even Cray Blitz can make typical pointless computer moves.)

17	Nf1-h2	Ba4-b3
18	Nf3-d2!	

(Black threatened 18 . . . Qa5-a4 followed by . . . Bb3-c2. Now the knight can eliminate the bishop if Black plays his queen to a4.

18	. . .	Nd7-b6
19	Nh2-g4	Bb3-a4
20	Nd2-f3	Rc8-g8
21	h4-h5	Ba4-b3
22	Nf3-d2	Qa5-a4
23	Nd2xb3	c4xb3
24	g5-g6	f7xg6
25	h5xg6	h7-h6
26	Qb1-d3	

(Now Black cannot prevent a lethal sacrifice at h6.)

26		Be7-h4
27	Rh1xh4	Resigns

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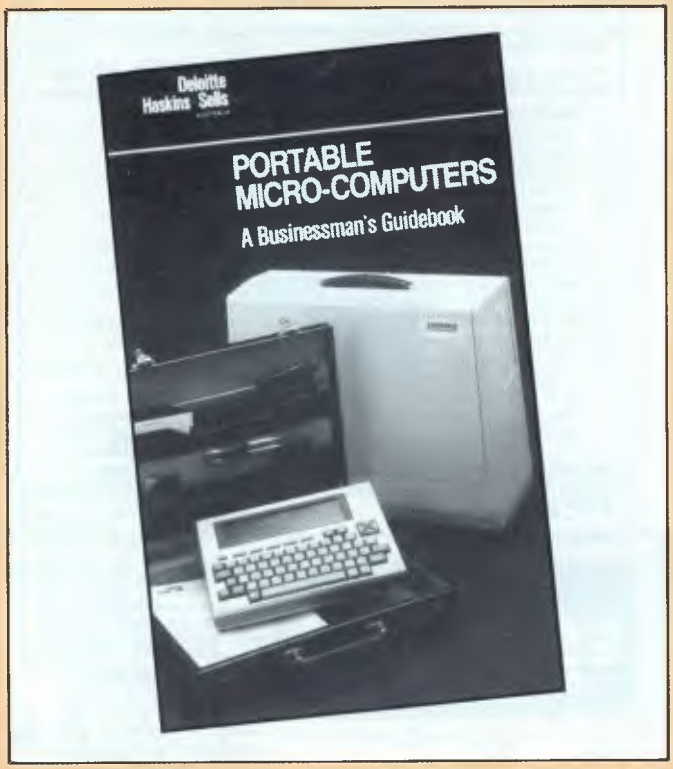
BIBLIOFILE

This month Steve Withers' selection from the bookshelf delves into the elusive area of portable computers.



Portable Microcomputers

Subtitled 'A Businessman's Handbook' (didn't they hear of the fuss over *APC*'s December 83 cover illustration of portable computers?), this book is clearly aimed at Deloitte Haskins and Sell's clients. It provides computer-naive readers with some sensible answers, along with several questions they may not have thought of asking.

A very matter-of-fact perspective is taken. In fact Chapter One starts with the question 'Portable microcomputers: what are they?' This is not the trivial question it may seem — after all, compared with a minicomputer the size of several fridges bolted together, you could consider any micro as being portable. Going to the other extreme, some pocket calculator-like devices are programmable in Basic. Anyway, two categories are identified for the purposes of the book, briefcase machines (ie, those that fit inside a briefcase) and suitcase portables (such as the Osborne). The latter are becoming known as 'luggables' in recognition of their not inconsiderable weight.

While much consideration is given to the needs of the absolute beginner (for example, jargon is kept to a minimum, and that which must be used is explained — but not always accurately!) and those who think they need a portable computer but aren't sure why, the bulk of the book is devoted to a description of the portables currently available or soon to be on sale in Australia (if you like lists, here goes: Apricot, Columbia VP, Compaq, Dot, Hyperion, Kaypro II, Osborne Executive, Apple IIc, Magnum, Gavilan, and NEC 8201). I deliberately chose the term 'description' even though the book refers to reviews because there is little in the way of critical or evaluative comment, and no attempt to compare the various machines. For instance we are told that the Apricot's keyboard is 'easy to use', and that the screen 'has very good resolution', while the carrying handle 'could prove to be uncomfortable'. I'm not saying that these things are unimportant, but more detailed comments would have been useful. Thinking of the person who has never used a computer before, what exactly is an easy to use keyboard?

Perhaps the best approach would be to use this book to provide the necessary background to more extensive hardware evaluations — dare I suggest *APC* Benchtests?

Portable Microcomputers: A Businessman's Guidebook

Author: Anonymous
Publisher: Deloitte, Haskins and Sells, Sydney
Price: $14.95

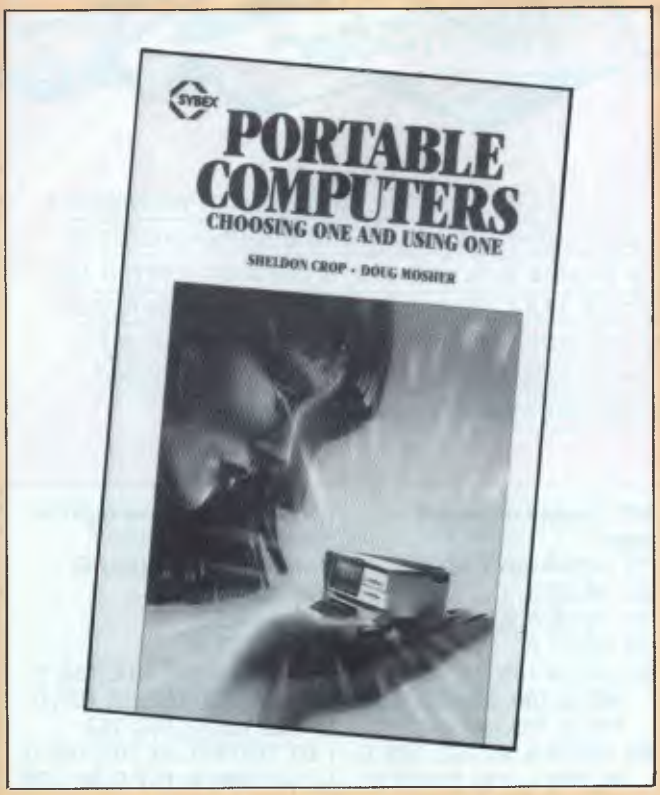
Portable Computers

Another book with a subtitle, this time 'Choosing One and Using One'. Crop and Mosher have managed to write a book in a style that is informal and informative. Despite the chatty approach ('Do you ever do research? Then an electronic information service would be helpful'), they manage to avoid talking down to the reader.

Another feature of the authors' style is that they write about real products without getting hung up on the relative merits of different models. They don't shy away from making comparisons when it is appropriate (eg, 'The floppy disk storage [of the Attache] is twice that of either the Kaypro or the Osborne'), but the emphasis is on what the buyer needs to know rather than what the manufacturers tend to emphasise.

A section that would be particularly useful to readers who are not already using computers is the collection of brief case studies showing how people in various occupations are using portable computers such as a sociologist using one to take notes at a convention and a lawyer keeping in contact with his office through electronic mail.

If you are looking for a straightforward, task-oriented guide to portable computers, this one is as good as any I have seen. I only noticed one error of fact, but it was a big one: '*any* portable that uses MS-DOS can also use *all* the software



available for the IBM Personal Computer' (my emphasis). Although much of the product-specific information may rapidly become outdated (like the 'rumours' of an IBM portable that now exists), Crop and Mosher have put together a useful book.

Portable Computers: Choosing One and Using One

Authors: Sheldon Crop and Doug Mosher
Publisher: Sybex
Price: $14.50

All About Hand-held and Briefcase-portable Computers

This book is divided into three sections, describing the nature of hand-held computers, the range of different models on the (American) market, and what you can do with one after you have bought it.

Unlike Crop and Mosher, Hohenstein takes a technological perspective — he starts by writing about memories, displays, keyboards and processors, and only then does he move onto electronic mail, financial calculations and training applications. As he suggests that hand-helds may become more widely used than desktop computers, this seems a strange approach.

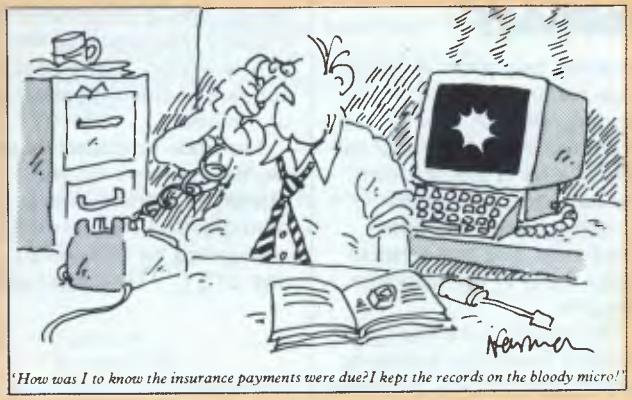
Part two describes twenty models (about a dozen different designs once 'badge engineering' has been allowed for) in considerable detail. I suspect that much of it comes from manufacturers' publicity material and documentation — this is also the source of the illustrations. I'm inclined to suggest that this book provides 'data' rather than 'information', as machines are described without critical comment or an explanation of the importance or relevance of certain features.

The final section deals with software. Several sources are mentioned, mainly books and magazines, but also some software companies. There are also thirteen program listings for the Sharp PC-1211/Radio Shack PC-1. These cover a variety of applications from financial ratio analysis and economic order quality calculations to a shopper's aide that accumulates a running total of purchases (have you ever been stuck in a checkout queue while another shopper tries to scrape together his or her last few cents to cover the trolly-load of groceries?) and gives a breakdown of the purchases by category (meat, veges, dairy, etc).

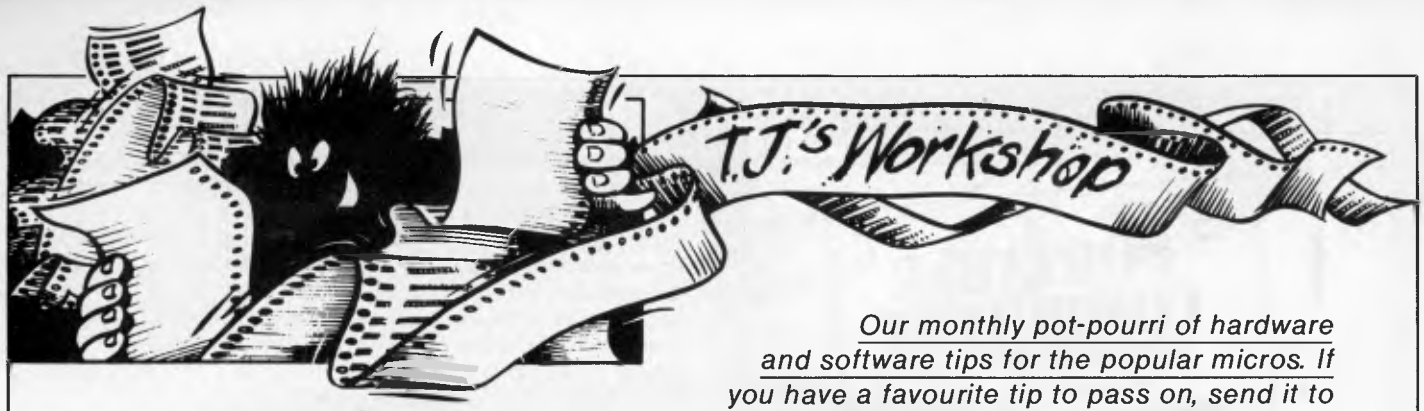
If you are planning to buy a hand-held in the very near future, this book could save you some time when it comes to comparing one model with another, but if you're simply curious about these small systems you might find it all rather boring.

All About Hand-held and Briefcase-portable Computers

Author: C Louis Hohenstein
Publisher: McGraw-Hill
Price: $17.95



'How was I to know the insurance payments were due? I kept the records on the bloody micro!'



Our monthly pot-pourri of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to 'TJ's Workshop', 77 Glenhuntly Road, Elwood, Victoria 3184. Please keep your contributions as concise as possible. We will pay $10-$30 for any tips we publish. APC can accept no responsiblity for any damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.

Commodore 64 paging

Some micro users are probably well aware of the use of a 'PAGE' command to allow more than one program to be stored in memory at one time. This very useful facility can be easily implemented on the Commodore 64.

The Commodore 64 has a system variable which stores the start of a Basic program. This is located at addresses 43 (low byte) and 44 (high byte).

Separate programs can be stored in different places in memory, simply by altering these memory locations to the relevant addresses. Basic programs on the 64 are normally stored at address 2049 (location 44 set at 8 and location 43 set at 1). To store another program at another location in memory, set location 43 to 0 and 44 to the high byte of the address you wish your program to start at (high byte is the address divided by 256).

Before entering the program type NEW, and the memory area you have chosen will be set up.

To retrieve the old program set at another memory location, set locations 44 and 43 to the address where the program is stored. For example, enter:

10 PRINT "PROGRAM 1"

and type POKE 44,100 POKE 43,0:NEW.

Now enter:

10 PRINT "PROGRAM 2".

Program 1 can be retrieved by:

POKE 44,8:POKE 43,1

(normal program area) and program 2 by:

POKE 44,100:POKE 43,0

(new program area).

C Hinton

VIC 20 machine code routines

Here are two short machine code routines for the Commodore VIC 20: one to move the top 11 lines of the display one character from the left-hand side of the screen towards the right-hand side; and the other to move them in the opposite direction.

The routines are particularly useful for a moving information display or games like Space Invaders, in which characters are continually moving backwards and forwards. The character at the end of the display line (which end is determined by the way the display is moving) is erased, and a space appears at the opposite end of the line.

The code is loaded by simple Basic programs and resides in a spare area of memory. The two routines are started by SYS (673) and SYS (721) respectively.

R Parfect

VIC display move left to right.

```
10 FOR A=673 TO 720
20 READ S
30 POKE A,S
40 NEXT A
50 DATA 169, 22, 133, 1,
   162, 0, 160, 32, 189, 0, 30,
   133, 0, 152, 157
60 DATA 0, 30, 232, 188, 0,
   30, 165, 0, 157, 0, 157, 0,
   30, 232, 228, 1, 208
70 DATA 233, 224, 242, 208,
   1, 96, 169, 22, 24, 101, 1,
   133, 1, 160, 32
80 DATA 76, 169, 2
```

VIC display move right to left

```
10 FOR B=721 TO 768
20 READ T
30 POKE B,T
40 NEXT B
50 DATA 169, 219, 133, 1,
   162, 241, 160, 32, 189, 0,
   30, 133, 0, 152, 157
60 DATA 0, 30, 202, 188, 0,
   30, 165, 0, 157, 0, 30, 202,
   228, 1, 208
70 DATA 233, 224, 255, 208,
   1, 96, 169, 234, 24, 101, 1,
   133, 1, 160, 32
80 DATA 76, 217, 2
```

Security and protection

Most people are interested in protecting their programs on their home micros. A useful *FX command for the BBC micro is *FX200,3 which carries out two tasks: it totally disables the escape key; and on pressing the BREAK key or CONTROL BREAK, it scrambles the memory so that when OLD is typed in order to retrieve the program, Bad Program will appear on the screen.

Another hint for the BBC users is the Break routine. This is done with the command CALL&0903. It can be used directly from Basic programs and could be useful for 'another game' option.

G Tweddle

Atari chord construction

The Atari computer has four independent sound voices which means it can make four sounds simultaneously. The sound comes through the TV speaker and the voices can be blended together to make chords.

The chord of 'C' can be produced by typing the following:

```
SOUND 0,121,10,8
SOUND 1,96,10,8
SOUND 2,81,10,8
SOUND 3,60,10,8
```

The first figure is the voice number, the second the pitch, the third distortion, and the fourth loudness.

The distortion values are 0, 2, 4, 6, 8, 10 and 12 where 10 is pure. The pitch can be set between 0 and 255 and the Atari will produce all notes: sharps, flats and naturals from one octave below middle C to two octaves above it.

You can obtain the strange noise played at the beginning of Defender by playing two very similar notes to produce a beat frequency:

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MPA/ APC 9

```
SOUND 0,255,10,15
SOUND 1,254,10,15
```

The following routine produces an interesting sound effect by using all four voices with FOR and NEXT loops.

```
10 FOR 1  1 TO 100
20 FOR Z=100 TO 1 STEP
   -10
30 SOUND 0,I,10,15
40 SOUND 1,Z,10,15
50 NEXT Z
60 NEXT I
70 FOR I=1 TO 100
80 SOUND 0,I,8,10
90 SOUND 1,I,8,10
100 NEXT I
```

W Davison

Z80 machine code triple bill

Here are three tips for Z80 machine code programmers.

Instead of the two byte instruction LD A, 0, the same result can be achieved by XOR A, (AFhex)and this is one byte shorter.

A little used instruction CPL, (2F hex), like the first tip, has the advantage over the more commonly seen XOR 255 of being only one byte long. This reverses each bit in the 'A' register (eg 10101010 becomes 01010101).

The following routine will allow a program using CALLS or JPS to be relocatable.

CALL RET; call any RET in ROM
DEC SP; decrease stack
DEC SP; pointer twice
POP HL; HL address of DEC SP

This works because a CALL puts the address of the next instruction on the stack. For example: CALL 0070 could be the first line on a Spectrum.

CG

Routine aids complete recovery

Here is a machine code routine for the Oric-1 which enables the complete recovery of a Basic program after the command has been issued. Note that recovery is not possible if a new program line has been entered or an error occurs.

J Dunster

```
10 REM OLD command JPD 1984
20 FOR A = #400 TO #447
30 : READ B
40 : POKE A,B
50 NEXT A
60 DOKE #2F5,#400 ' Reset ? to OLD
70 END
80 DATA #A0,#00,#B9,#05,#05,#F0,#04
81 DATA #C8,#4C,#02,#04,#C8,#98,#18
82 DATA #69,#05,#8D,#01,#05,#A9,#05
83 DATA #8D,#02,#05,#A9,#01,#85,#00
84 DATA #A9,#05,#85,#01,#A0,#00,#B1
85 DATA #00,#D0,#13,#C8,#B1,#00,#D0
86 DATA #0E,#A5,#00,#18,#69,#02,#85
87 DATA #9C,#A5,#01,#69,#00,#85,#9D
88 DATA #60,#A0,#00,#B1,#00,#AA,#C8
89 DATA #B1,#00,#86,#00,#85,#01,#4C
90 DATA #20,#04
```

Cursor stays put while you print controls

The routine here for the Commodore 64 allows the cursor characters to be added to a string during a GET loop. This has the effect of printing the cursor control characters rather than actually moving the cursor.

This can be demonstrated by entering: E(cursor down)E(cursor down)E (reverse on) (control black)EE(reverse off)(cursor up)E(cursor up)E, then hit the F1 key.

POKE 212,1 puts you into quote mode so that characters are printed to the screen as if preceeded by a quote when writing a Basic program line.

P Haynes

T.J.'s Workshop

```
10 P$="": PRINT"{CLS}"
20 PRINT "ENTER STRING NOW - PRESS
   F1 TO PRINT STRING"
30 POKE 212,1:GET A$: IF A$="" THEN 30
40 IF A$=CHR$(133) THEN 80
50 P$=P$+A$
60 PRINT A$;
70 GOTO 30
80 POKE212,0:PRINT "{3*CURSOR DOWN}"
90 PRINT P$
100 POKE 214,15:PRINT"{CURSOR DOWN}"
```

Commodore's new characters

Here is a way of changing the character set on the Commodore 64 to create a new character set which is make up of two different colours.

```
1 READ A
2 IF A  - 1 THEN END
3 POKE 53317 « A,31
4 GOTO 1 5 DATA
28,81,65,-1
```

J McMurrary

Quick as a flash on the Commodore 64

This routine demonstrates some interesting effects which can be created using the video chip in the Commodore 64.

For example if characters are on the screen in light blue, with the registers 53281 to 53283 POKEd with 6 (dark blue) you can make them disappear.

In the following example it is used to flash characters on the screen while waiting for a response.

To turn effect on: POKE 53270, PEEK (53270) OR 16.

To turn effect off: POKE 53270, PEEK (53270) AND 239.

BW

```
1 PRINT CHR$(147)
10 FOR I=0 TO 2
15 PRINT CHR$(154) : PRINT CHR$(18);
20 PRINT "THIS WILL FLASH"
25 PRINT CHR$(144) : PRINT
30 PRINT "THIS WON'T FLASH"
40 POKE 53281+I,6 : NEXT
45 PRINT CHR$(154) : PRINT CHR$(18);
50 PRINT "PRESS ANY KEY"
60 POKE 53270,PEEK(53270) OR 16
70 FOR I=0 TO 150 : NEXT
80 POKE 53270,PEEK(53270) AND 239:
90 FOR I=0 TO 150 : NEXT
100 GET A$: IF A$="" THEN 60
110 POKE 53270,PEEK(53270) AND 239 : END
```

Blowing up your characters

A high-resolution explosion can be generated at any character position on the 16k/48k Spectrum's screen, using the program listed. S=row, T=column and W$=character to be

blown up.

You can alter the size of the explosion by adjusting the value of B in the FOR-NEXT loop at line 230 and at lines 290 and 380.

M Hawkins

```
100 PAPER 0
110 BORDER 0
120 CLS
130 INPUT "ROW ?  (0 TO 21)";S
140 INPUT "COLUMN ? (0 TO 31);T
150 PRINT INK 6;AT S,T;"G"
160 LET W$="G"
170 OVER 1
180 BRIGHT 1
190 LET X=0+T*8+4
200 LET Y=175-S*8-4
210 FOR A=1 TO 2
220 IF A=2 THEN PRINT AT S,T;W$
230 FOR B=0 TO 29 STEP 2
240 LET C=B*(X+B<256)
250 LET D=B*(Y+B<176)
260 LET E=B*(X-B>-1)
270 LET F=B*(Y-B>-1)
280 INK 2+INT (RND*6)
290 IF B>14 THEN GO TO 380
300 PLOT X+C/2,Y+D
310 PLOT X-E/2,Y-F
320 PLOT X+C/2,Y-F
330 PLOT X-E/2,Y+D
340 PLOT X+C,Y+D/2
350 PLOT X-E,Y-F/2
360 PLOT X+C,Y-F/2
370 PLOT X-E,Y+D/2
380 IF B>15 THEN GO TO 430
390 PLOT X+C-1,Y+D-1
400 PLOT X-E+1,Y-F+1
410 PLOT X+C-1,Y-F+1
420 PLOT X-E+1,Y+D-1
430 PLOT X,Y+D
440 PLOT X+C,Y
450 PLOT X,Y-F
460 PLOT X-E,Y
470 NEXT B
480 NEXT A
490 BRIGHT 0
500 OVER 0
```

Using Easy-script and 1520 plotter

You can use the Commodore 1520 plotter with Easy-script, and without all the OPEN statements, using this program.

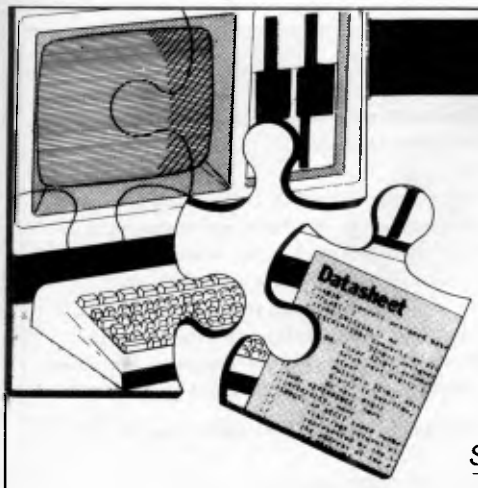
When run, the program asks for the number of columns to be used, and sets the plotter to lower case mode and loads Easyscript.

To obtain a hard copy, the printer option should be 0 and the following sequence of keys should be pressed: 'f1,0,D,0,6 return,P'.

M Desmond

```
1000 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
1010 REM xxx   EASY SCRIPT SET UP    xxx
1020 REM xxx   BY MATTHEW DESMOND    xxx
1030 REM xxx USE WITH 1520  PLOTTER xxx
1040 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
1050 REM xxx  WHEN COPY  IS NEEDED   xxx
1060 REM xxx TYPE F1,0,D,6 (RET) ,P xxx
1070 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
1080 PRINT"s";
1090 PRINT"HOW MANY COLS ?Q"
1100 PRINT"1) 80"
1110 PRINT"2) 40"
1120 PRINT"3) 20"
1130 PRINT"4) 10"
1140 GETA$:IFA$=""THEN1140
1150 A=VAL(A$)
1160 IFA<1ORA>4THEN1140
1170 OPEN3,6,3:PRINT#3,A-1:CLOSE3
1180 OPEN1,8,15:PRINT#1,"I":CLOSE1
1190 OPEN6,6,6:PRINT#6,1:CLOSE6
1200 PRINT"INSERT EASY SCRIPT DISK"
1210 PRINT"QPRESS A KEY WHEN DONE"
1220 POKE198,0
1230 GETA$:IFA$=""THEN1230
1240 CLR:LOAD"0:x",8,1
```

SUBSET



Alan Tootill and David Barrow present more useful assembler language subroutines. This is your chance to build a library of general-purpose routines, documented to the standard we have developed together in this series. You can contribute a Datasheet, improve or develop one already printed or translate the implementation of a good idea from one processor to another. APC will pay for those contributions that achieve Datasheet status. Contributions (for any of the popular processors) should be sent to SUB SET, 77 Glenhuntly Road, Elwood, Vic 3184.

As the old brigade of Z80 and 6502 squeezed out the 6809 last month, this month we have four routines for the 6809 and one for the NS16000. Never heard of it? Read on and see just how sophisticated assembly language is becoming.

Hexadecimal print

DHEX and BHEX (one routine, two entry points) from Jeff Shepherd prints the contents of the double-byte register D (a combination of A as high byte and B as low byte) as four hexadecimal digits, if entered at DHEX. If it is entered at BHEX, just the two digits of the B register are printed.

All four of this month's 6809 routines need a subroutine which will print an ASCII character input in an accumulator. DHEX is the odd one out, as it sends the character in the B accumulator. The other routines use A.

If anyone considers it worth rewriting DHEX to make it conform to the use of the A accumulator as the primary I/O register, you could make use of the 6809's DAA (Decimal Adjust A) instruction. If A is used, the 8-byte binary nibble to ASCII Hex (11th to 14th instructions in DHEX) can be replaced by the following 6-byte method:

```
ADDA #$90    :  8B90
DAA          :  19
ADCA #$40    :  8940
DAA          :  19
```

Datasheet

```
;* DHEX & BHEX  -  Print the hex value from D or B.
;/ CLASS:  1
;/ TIME CRITICAL?:  No.
;/ DESCRIPTION:  Prints the binary value (unsigned) of D or B
;/               in hexadecimal.
;/               Entry at DHEX:  prints D.
;/               Entry at BHEX:  prints B.
;/ ACTION:   Repeat twice:
;/           Swap A and B, printing A 1st time, B second
;/           Rotate right B high digit into B low nibble
;/           Save B on stack
;/           Change B high nibble to ASCII code
;/           Go print ASCII hex
;/           Recover B from stack
;/           Rotate right B to restore low digit to low nibble
;/           Save, convert, print and recover as for high digit.
;/ SUBr DEPENDENCE:  PRASCB, a subroutine to print the ASCII
;/                   character in B.  It must not change A.
;/ INTERFACES:  None.
;/ INPUT:    for DHEX: unsigned 16-bit number in D.
;/           for BHEX: unsigned 8-bit number in B.
;/ OUTPUT:   Number printed. A & B unchanged.
;/ REGs USED:  A B CC
;/ STACK USE: S:  8 + that used by PRASCB.
;/            U:  None.
;/ LENGTH:   28
;/ PROCESSOR:  6809
;
DHEX    BSR  SWAP        ;repeat SWAP twice to          8D 00
SWAP    EXG  A,B         ;do A first, then B, in B.     1E 89
BHEX    BSR  ROLL        ;rotate so first high          8D 01
        RORB             ;digit, then low digit is      56
ROLL    RORB             ;shifted to low nibble B       56
        RORB             ;                              56
        RORB             ;                              56
        RORB             ;                              56
        PSHS B,CC        ;save all bits.                34 05
        ANDB #%00001111  ;mask out high nibble          C4 0F
        ADDB #$30        ;and convert to ASCII          CB 30
        CMPB #$3A        ;adjusting for latter          C1 3A
        BLO  NUM         ;digits.                       25 02
        ADDB #7          ;                              CB 07
NUM     JSR  PRASCB      ;go print it.                  BD XX XX
        PULS PC,B,CC     ;restore and return.           35 85
```

Message builder

One thing that may have struck you about DHEX is that most of the action occurs inside a twice-nested, fall-into subroutine. This type of programming for twice-performed actions is quite common and natural in 6809. Because of the branch to subroutine instruction, it is also a Sub Set Class 1 operation.

MAKMSG from George Perkins is recursive — it calls itself from the inside rather than fall into a part just called. MAKMSG is a straight translation into 6809 of a Z80 original which appeared in Sub Set in November 1983. Straight, that is, except that the program relative BSR makes it relocatable; the Z80 original had to use the direct addressing CALL instruction. The 6809 MAKMSG fails to make Class 1 only because it corrupts D and CC.

MAKMSG works by testing each character picked up. If the character is valid ASCII (including control codes) then it is printed. If it's higher than 127, the next two bytes are taken as the address of a sub-message to be inserted in the message. A null (0) byte terminates any message or sub-message.

Checking the 6809, MAKMSG has brought up one error in the documentation of the original Z80 version. The stack use should read: 4 * number of sub-messages + 2 + WRCHAR stack use.

Datasheet

```
;= MAKMSG - 6809 Message assemble and print routine.
;/ CLASS:  2  (corrupts register contents).
;/ TIME CRITICAL?:  No.
;/ DESCRIPTION:  Recursive procedure to assemble and print
;/               messages composed of ASCII characters and
;/               sub-messages.
;/ ACTION:   IF character picked up is a null (0) THEN exit
;/           ELSE IF character is ASCII THEN print it, get next
;/           ELSE get escape address and re-call MAKMSG.
;/ SUBr DEPENDENCE:  PRASCA, a subroutine to print the ASCII
;/                   character in A without corrupting X.
;/ INTERFACES: RAM containing messages.
;/ INPUT:    X addresses the first byte of the top level
;/           message.
;/ OUTPUT:   X addresses the byte following the top level
;/           message terminator.  Message printed.
;/ REGs USED:  X A B CC U
;/ STACK USE: S: 2 * no. of sub-messages + 2 + PRASCA stack use.
;/            U: 2 * no. of sub-messages.
;/ LENGTH:   25
;/ PROCESSOR:  6809
;
MAKMSG  LDA  ,X+         ;pick up next byte and          A6 80
        TSTA             ;test for =0, or >127.          4D
        BEQ  RETURN      ;exit level if null byte.       27 13
        BPL  MKMSG1      ;go print valid ASCII.          2A 0C
        LDD  ,X++        ;get escape address, bump       EC 81
        PSHU X           ;point and save it for return   36 10
        TFR  D,X         ;index next level message       1F 01
        BSR  MAKMSG      ;recurse to print sub-message   8D F1
        PULU X           ;restore this level pointer     37 10
        BRA  MAKMSG      ;and go get next byte.          20 ED
MKMSG1  JSR  PRASCA      ;go print character             BD XX XX
        BRA  MAKMSG      ;and go get next byte.          20 E8
RETURN  RTS              ;exit this level / end.         39
```

Program-embedded text

Building up long messages from nested sub-messages is OK if you have to squeeze a lot of text into a little space. For short messages, it's often easier to embed them in the program, right after the call to the sub-routine which will deal with them.

We have two PET routines for the 6809. TEXTS (S for short) is from thirteen-year-old Jonathan Marsh. TEXTQ (Q for quick) is from G Wraith. The slightly quicker TEXTQ, which also preserves its register contents, achieves the extra speed by knocking an unconditional branch out of the central iteration (Fig 1) while TEXTS keeps it in (Fig 2).

TEXTQ also shaves off one cycle and one byte, by assuming that the ASCII character print subroutine it calls can be addressed in the Direct Page mode. Fair play?

Both TEXTS and TEXTQ will work through the message, one byte at a time, until they come to a null (0) teminator, at which point they return to the byte after the terminator. For both routines, the message can be embedded as:

```
JSR     TEXTS (or TEXTQ)
FCC     'message
FCB     0
```

(program continues here on return).

Datasheet

```
;= TEXTS - 6809 Program embedded text printer (short).
;/ CLASS: 2 (registers corrupted).
;/ TIME CRITICAL?: No
;/ DESCRIPTION:  Prints message stored in the calling program
;/               immediately after JSR TEXTS and ending with 0.
;/ ACTION:   Move return address into X.  Get character into
;/           A using X as auto-incrementing pointer.  If
;/           character is a null (0) then transfer X to PC by
;/           indexed jump, causing a return to location after
;/           message terminator.  Else print character and repeat.
;/ SUBr DEPENDENCE:  PRASCA, a subroutine to print the ASCII
;/                   character in A without corrupting X.
;/ INTERFACES:  None.
;/ INPUT:    Text after JSR TEXTS ending with a null.
;/ OUTPUT:   Text printed, program resumed.
;/ REGs USED:  X A CC
;/ STACK USE: S: 0 + PRASCA stack use.
;/            U: None.
;/ LENGTH:   13
;/ TIME STATES: 19 + chars * (20 + PRASCA time)
;/ PROCESSOR:  6809
;
TEXTS   PULS X           ;return address to X as point   35 10
LOOP    LDA  ,X+         ;next char and bump point       A6 80
        BEQ  DONE        ;end on a null.                 27 05
        JSR  PRASCA      ;else go print character        BD XX XX
        BRA  LOOP        ;then go get next.              20 F7
DONE    JMP  ,X          ;resume program after message.  6E 84
```

Datasheet

```
;= TEXTQ - 6809 Program embedded text printer (quick).
;/ CLASS: 1
;/ TIME CRITICAL?: No.
;/ DESCRIPTION:  Prints message stored in the calling program
;/               immediately after JSR TEXTQ and ending with 0.
;/ ACTION:   Save registers.  Move return address into X.  Get
;/           character into A using X as auto-incrementing
;/           pointer.  If character is not a null (0) then
;/           print it and repeat.  Else restore new return
;/           address to stack, restore registers including PC
;/           thus returning to location after text terminator.
;/ SUBr DEPENDENCE:   PRASCA, a subroutine to print the ASCII
;/                    character in A without corrupting X.
;/ INTERFACES:  None.
;/ INPUT:    Text after JSR TEXTQ ending with a null.
;/           DP contains page number where PRASCA is located.
;/ OUTPUT:   Text printed, program resumed.
;/ REGs USED:  DP CC
;/ STACK USE:  S:  5 + PRASCA stack use.
;/             U:  None.
;/ LENGTH:   16
;/ TIME STATES:  42 + chars * (16 + PRASCA time)
;/ PROCESSOR:  6809
;special notation: PP represents PRASCA location on DP page.
TEXTQ   PSHS X,A         ;Save registers used and get    34 12
        LDX  3,S         ;return address to X as point   AE 63
        BRA  GETCH       ;jump into loop to get char     20 02
LOOPQ   JSR  PRASCA      ;go print character and         9D PP
GETCH   LDA  ,X+         ;get next char, bump point      A6 80
        BNE  LOOPQ       ;go print if not terminator     26 FA
        STX  3,S         ;else replace inc'd return      AF 63
        PULS PC,X,A      ;address. Restore and return.   35 92
```

Practical Pick

David O'Byrne concludes his examination of the Pick operating 'environment' with a look at the wide range of utilities available and their relation to the Proc procedural language.

The Pick operating system has a reputation for flexibility, due partly to the ease with which data formats and relationships can be amended, and partly to the wide range of tools available to the user — a large collection of utilities that can be extended by means of the procedural language, Proc.

All Pick commands are entered at a base prompt, known as the terminal control language or TCL. Generally, these commands conform to the following format (the filename and record-key may not be required in some cases):

COMMAND filename record-key(s)
(OPTIONS) <Return>

Commands entered will normally invoke a system utility, a Proc, a Basic program, or an enquiry sequence. One of the features of the Pick system is that system commands can be removed or renamed, providing a tailored environment for each user.

Command options are standard throughout Pick, with options such as (P) to direct output to the printer and (S) to suppress error messages. The simplified file organisation of Pick means that file-orientated commands can be used (assuming suitable access levels and privileges) on any file in the system, whether it contains system software, Basic programs, text, or data.

As several of the system utilities are written in Proc, they can be amended by the user to suit his requirements. Probably the most common change is to amend disk-to-tape security to start at a specific time (that is, when all users have finished for the day).

Standard utilities supplied with Pick include the full range of file management facilities (create, clear, delete, copy, display, secure), together with general system utilities which enable the user to make full use of magnetic tape and spooler. Additional utilities cover areas such as system performance, parameter setting, monitoring, and sending of messages to other terminals.

Suitability

The VDU market is very competitive today, with users demanding a choice of terminal types, and Pick is particularly well-suited to the attachment of a range of different terminals. Although the actual number and range of terminals supported varies depending on which hardware the operating system is running on, the majority support up to a dozen different brands. This is achieved by using standard cursor control sequences, which are translated by the OS into the relevant codes for the particular terminal.

One interesting feature of the operating system is its treatment of error/information messages, most of which are held in a central file. The user is allowed to tailor messages, even to create differing versions of the messages for each account.

This gives the designer tremendous flexibility in putting together a system, and makes it readily acceptable to the end user.

The standard system editor is a line editor and acts upon only one record within a file at any one time. Data in the editor is shown as a series of lines, each line being a field within the data record; the line numbers relate to individual field numbers. The line pointer can be positioned at the top (first field) or bottom of the record, or within the record on an absolute or relative basis.

Commands are available to add, replace, locate, merge, delete and list data, to expand macros, set tabs and reverse previous commands, with options to limit or completely suppress output, line numbers, or object code. There are ten 'prestore' buffers available which facilitate the storage of strings of editor commands, and the subsequent execution of the string by means of the prestore buffer number, that is, 'P4'. These buffers have space for 100 characters each, with the facility to chain buffers (prestore P1 calls P2 which calls P3): this makes repetitive editing of a series of data records a relatively painless operation.

As with any operating system, Pick has a number of commands that prove especially useful for the programmer. There are calculator commands for addition, subtraction, multiplication and division in either decimal or hexadecimal, together with conversion commands for decimal to hex and *vice versa*. There is a search facility for locating occurrences of a particular string anywhere within the records of a particular file. There are commands to display or clear any basic locks, and there is check-sum creation to highlight whether changes within a particular file/field have occurred.

Pick also includes a sophisticated print spooling system which enables users to direct output to any printer attached to the system, including those attached directly to a terminal.

Output from a process (an enquiry, a Basic program, a utility) to the printer is stored in a 'print job', which is assigned to a particular job queue. Each job queue will be associated with a logical

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printer, thus enabling output to be carried out on any one of a number of physical printers. The spooler is capable of supporting approximately four parallel and sixteen serial printers.

A comprehensive set of print utilities allows the user to modify the printer arrangements, examine individual print jobs (including the use of a string search facility), and set up automatic print direction for individual databases, ports, or users. The main advantage of this system is its flexibility in directing output from any process to any printer connected to the system, or to the mag tape unit (for archiving or transfer to another system).

Pick includes both text and word processing options. For text there is Runoff, essentially a print formatting utility that has been used extensively in large related document areas such as the production of manuals or contracts.

The word processing option is a more recent acquisition, which was developed by an outside firm and then incorporated into the operating system as a standard feature. Called Jet, it features the usual word processor facilities: full screen movement, move to next or previous character, word, sentence, paragraph, page, line, record, delete, insert and replace the same, character transposition, cut and paste, search and replace, and change case. These facilities mean that the system can perform word processing functions which have excellent links into the database. They also offer a considerable improvement in the entry and modification of programs.

'Pick's benefits are flexibility and ease of use, which make the design and maintenance of a computer system a much simpler and speedier task.'

Proc

The Pick operating system's Proc (stored procedure) language is effectively a job control language with one or two enhancements. A Proc can contain any command(s) that could normally be entered at TCL, it can accept input from and output to the user's terminal with validation, branching, field manipulation, and so on, and can link to other internal/external subroutines.

The usage of Proc tends to vary greatly between different sites. While often used as a means of storing strings of TCL commands, building complex enquiries, or processing menus in shorthand fashion, it can occasionally be used as an alternative programming language. Its advantages in this area lie mainly in its concise syntax and ability to pass parameters between several separate processes.

A Proc to execute a simple enquiry could be:

```
PQ
HLIST THE STOCK FILE PART DESC
  QTY
P
```

Line one of the Proc is an identifier. In this case, the command (LIST THE STOCK FILE) is held within the Proc as a literal and moved to the output buffer by means of the 'H' command. Finally, the contents of the output buffer are executed via the 'P' (process) command.

As you can see, the syntax is anything but wordy, the majority of Proc commands being one or two characters long. One essential feature of Proc is the ability to 'stack' inputs for a particular process, so that the process, once initiated, can have all subsequent responses supplied automatically from one of the output buffers.

There are commands within Pick's Basic programming language which allow the programmer to load information to or from the Proc buffers, a facility which becomes very important when one considers the integration of the various operating system features. This facility could be used to pass a selected list of record keys to a Basic program, thereby linking the easy-to-use data selection facilities of one Pick feature to the processing capabilities of another.

The most widespread use of Proc is in the menus area. Screens can be displayed from Proc in similar fashion to Basic, direct cursor control and highlighting are supported, together with conditional and unconditional branching. Operator entries can be validated (length, pattern, relational operators, and so on), and control passed to other Procs, Basic programs, enquiry sequences or utilities.

Another useful Proc feature is its ability to check error return codes from other system processes, enabling a Proc to take different courses of action depending on whether a previous process was completed successfully. A Proc can distinguish between the different types of message returned by the system at completion — all system error and information messages are held in a separate file, in order to ensure accurate processing of subsequent data. Many Pick utilities consist of Procs which drive other processes or amalgamate information from one or more functions. Any report of system information, such as details of terminals logged on, statistics relating to the current state of files, or computer usage statistics, should consist of a Proc driving one or more enquiry language statements.

Powerful enquiry language

Pick possesses one of the most powerful enquiry languages available, ideally suited to the demands of both applications programmer and end user.

The first part of an enquiry sentence is a 'verb' which specifies the action to be performed on the relevant file, for example, LIST, COUNT, SELECT. This is followed by the name of a file upon which the command will be processed. Only one filename may be specified, but the dictionary records used to access information within the file may refer to other files.

A verb and a filename are mandatory for any enquiry. The following elements are optional: record keys (for accessing specific records), selection criteria, sort criteria, output specifiers, print limiters, and various modifiers.

A sample enquiry command would be:

```
LIST CUSTOMERS WITH
  CREDIT-LIMIT < 5000
```

This command would process only those records meeting the selection criteria. To specify output criteria (default output fields can be set up in the dictionary file if required), the relevant fields' names are simply added to the statement: that is, NAME CREDIT-LIMIT BALANCE. To make commands more readable, a variety of 'throw-away' elements are available (and can be added by the user), which can be inserted at any point. For example, the above command could be specified:

```
LIST THE CUSTOMERS FILE WITH A
  CREDIT-LIMIT < 50000 PLEASE
```

Some of the available verbs are LIST, SORT, SELECT, SSELECT (sort and select), COUNT, SUM (for totalling a specific field), STAT (to provide count and averages), LIST- and SORT-LABEL (for printing labels), SAVE-, GET- and DELETE-LIST (for saving, restoring and deleting 'lists': that is, a series of record keys created via a SELECT or SSELECT), T-DUMP and T-LOAD (for selective dumping of information to/from tape/diskette), and ISTAT and HASH-TEST (for producing file-hashing histograms and file utilisation statistics).

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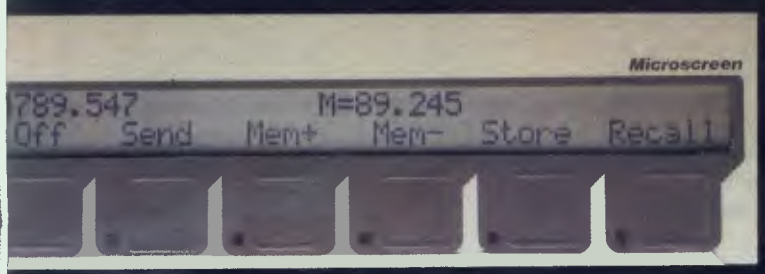

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selection criteria, a variety of relational operators and logical connectives are available: = or EQ, > or GT or AFTER, < or LT or BEFORE, >= or GE, <= or LE, $ or NE or NOT or NO, AND, OR. These can be used simultaneously to form a selection, such as WITH INVOICE-NO BEFORE "11/A22" AND WITH BALANCE <= 1000 OR WITH PAYMENT-CODE EQ 2.

To specify which data elements should be output, the user specifies the relevant dictionary names. If totalling is required, these are prefixed with 'TOTAL'.

Report headings and footings can be indicated by means of the HEADING and FOOTING specifications, a number of codes being allowed within a heading/footing to incorporate date, time, page number, control-break values and filename automatically, or to centre text within the heading, skip to new lines, and so on.

Where sorted information is required, the relevant dictionary names can be prefixed by BY, BY-DSND (for descending sequence), BY-EXP (for exploding fields containing multiple sub-fields), and BY-EXP-DSND. These are entered one after another, SORT STOCK BY CATEGORY BY-DSND QTY.

The enquiry language forms very much the core of Pick, and is probably the principal reason why people rate the system's 'user friendliness' so highly.

The provision of a powerful enquiry language/report generator means that one of the most onerous parts of the development cycle — the creation of reports matching the user's requirements — can be quickly and effectively completed, with subsequent alterations to the physical database being reflected in the data dictionary and not in the report statements. The end user can also enter his enquiries first-hand, thereby ensuring that his specific needs are fulfilled, and that the development team can progress without the restraining hands of the user.

Conclusion

Pick's benefits are flexibility and ease of use, which make the design and maintenance of a computer system a much simpler and speedier task.

The conceptual simplicity means that the system can safely be placed outside the DP department and be looked after totally by non-technical staff. This in no way reduces the capabilities of a system which, because of advanced features such as variable length data structure, database philosophy and powerful enquiry language, could be said to be the first true 'end user' computer system. END

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*See Australian Personal Computer, Feb., 1984.
**See Australian Micro Computerworld, Nov., 1983.

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TEACH YOURSELF ASSEMBLER

This month Paul Overaa continues his discussion of assembly language programming with a breakdown of the myriad and often complicated first steps.

This is part seven of *APC's* Teach Yourself Assembler series. It's unique in using Basic as its point of reference, and avoiding the 'drop you in it' approach often used on this subject. Three processors, the Z80 6502 and 8080 are covered in detail, but enough information is provided to enable users of other processors to follow the course. Copies of earlier articles in the series, which started in March 1984, may be obtained from our Back issues dept.

One of the problems with writing assembly language programs is that it's often difficult to know just where to begin. This is not so much an indictment of low level languages, but an indictment of many of the techniques used to identify the first steps needed. To give an example of how such breakdown can be performed, let's look at the simple problem of storing text in a buffer area.

Buffers

It is often necessary to temporarily store an input item before using it. Such temporary storage areas are termed buffers, and are areas of memory that we reserve as part of our program/memory use strategy. We select an arbitrary but commonly used arrangement that will take one page (256 bytes) of memory. The first byte, byte 0, will hold the character count; the remaining bytes will hold the characters typed in at the keyboad. A schematic description is shown in Fig 1.

In the source code, such an area would be defined using one of the 'define space' directives. The conventions vary from assembler to assembler but our Z80 assemblers, for example, would use the pseudo-op — DS 256 to reserve 256 bytes of uninitialised space within the object code.

What do we need to implement a routine that will place a word in a buffer? Obviously, some type of 'loop' (*cf* repetition structure) and a means of counting the number of characters typed in are required. We also need to test for the end of a word. Normally, we use a carriage return (ASCII 13) to signify the end of input, and earlier on in the series we used several loops that tested for such a character. We must also be able to identify which location in our buffer area is to be used for the current input character.

In the June issue we talked of 'computed addressing', that is, indexed and indirect addressing. We use computed addressing to determine the address of a 'buffer' pointer', to tell us where in the buffer the next character should be placed. On the 8080 we can only use indirect addressing, and we simply load the HL register pair with the address of the start of the buffer and increment HL as we add characters. On the Z80 and 6502 we can use either indirect or indexed addressing, which brings us to the following question. Can you see why it's better to use indirect addressing on the Z80, yet on the 6502 indexed addressing is more suitable?

The Z80 indexing facilities use a fixed displacement. Unless we create a run time modified displacement (which is of no real benefit in this case), it's simpler to use the HL register pair as an 'indirect pointer' into the buffer area (we'll need to maintain a 'count' of the number of characters). The 6502, on the other hand, implements a form of indexing whose displacement is held in the X or Y registers. By using this arrangement, we won't need to maintain a separate character count as the indexing variable itself provides the count.

We can define the essential characteristics of a 'Get-word' subroutine with the diagram in Fig 2. With one important (and deliberate) omission, this diagram will provide the overall structure needed.

What does the diagram show? After some initialisation (for example, setting up pointers) we perform a routine 'Build-string' at least once and up to a maximum of n times. The purpose of Build-string is to use a system routine to collect a character; then, if the character is *not* a carriage return we increment the character count and place the new character in the buffer. As soon as we detect a carriage return, we exit from Build-string and perform the last operation of the most left-hand side bracket: that is, END GET WORD. This entails

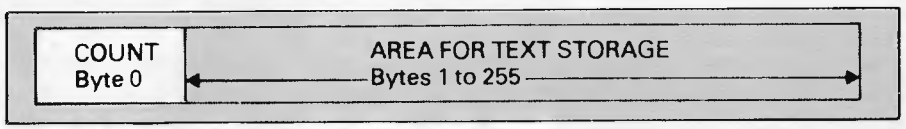

Fig 1 Text buffer layout

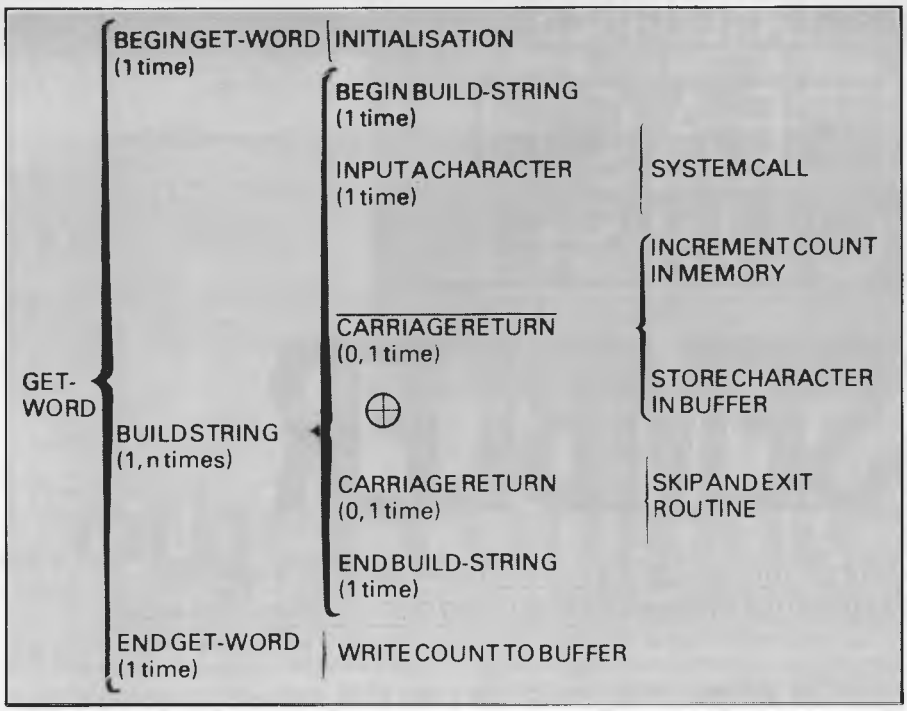

Fig 2 Input requirements for Get-word subroutine

```
GET$WORD:       LD      C,0                 ;Initialise count
                LD      HL,BUFFER$SPACE     ;Start of buffer

BUILD$STRING:   CALL    INPUT$ROUTINE       ;System call
                CP      CARRIAGE$RETURN     ;Is it a CR?
                JR      Z,CLOSE$BUFFER
                INC     C                   ;Increment count
                INC     HL                  ;Increment pointer
                LD      (HL),A              ;Store character
                JR      BUILD$STRING        ;Back for next character

CLOSE$BUFFER:   LD      HL,BUFFER$SPACE     ;Need start address again
                LD      (HL),C              ;Store character count
                RET                         ;Return from subroutine
```

Fig 3 Get-word Z80 version one

```
GET$WORD:       MVI     C,0                 ;Initialise count
                LXI     H,BUFFER$SPACE      ;Start of buffer

BUILD$STRING:   CALL    INPUT$ROUTINE       ;System call
                CPI     CARRIAGE$RETURN     ;Is it a CR?
                JZ      CLOSE$BUFFER
                INR     C                   ;Increment count
                INX     HL                  ;Increment pointer
                MOV     M,A                 ;Store character
                JMP     BUILD$STRING        ;Back for next character

CLOSE$BUFFER:   LXI     H,BUFFER$SPACE      ;Need start address again
                MOV     M,C                 ;Store character count
                RET                         ;Return from subroutine
```

Fig 4 Get-word 8080 version one

writing the character count at the head of the buffer. A Z80 translation is shown in Fig 3 using a simple loop. When a carriage return is detected, we perform a relative jump to CLOSE$BUFFER, re-load HL with the starting address of the buffer, and store the contents of the C register (which is used to hold the character count) by using a LD (HL), C instruction. Remember that this will store the contents of the C register into the byte whose address is specified by the CONTENTS of HL: that is, it stores the character count at the start of the buffer.

An equivalent 8080 form avoiding relative jumps is shown in Fig 4, and again the code is based on the diagram structure. Remember — with the 8080 mnemonics, LXI loads a register PAIR and MVI loads a single register, thus MVI C,0 is placing zero into the C register, but LXI H, BUFFER$SPACE is placing the address BUFFER$SPACE into the HL register pair. Remember also that the letter 'M' represents the 8080 convention for an indirect address held in the HL register pair, thus LD (HL),A on the Z80 has an 8080 parallel instruction that is written as MOV M,A.

The 6502 version (Fig 5) performs the same essential functions but uses indexed addressing. We start by initialising the Y register to zero, then we use a loop to collect characters from the keyboard. If a character is not a carriage return, we increment Y (the character count) and store the character using STA (BUFFER$SPACE),Y. This is using indexed addressing to place the accumulator contents in the byte whose address is given by the base address (which the assembler calculates from your BUFFER$SPACE label), plus the offset held in the Y register.

To 'close' the buffer, we store the contents of the Y register at the start of the buffer. This is achieved by the instruction STY BUFFER$SPACE.

The three routines are all correct in that input data will be placed into the buffer as required, but we did say that there's a deliberate omission. What is it? In practice, the buffer can hold only 255 characters, so it's necessary to perform a check to see whether the buffer is full or not. Here's a couple of problems concerning this check.

Problem one

In every version we have shown, it's possible to add a single instruction to perform a suitable check. Think about the effect of incrementing the count as the buffer becomes full, and decide which flag will be affected. Use this flag to conditionally jump or branch out of the loop and perform the close buffer operation.

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Problem two

The test for possible buffer overflow should be indicated on the Warnier diagram. The mutually exclusive action subsets to be added are as follows:

BUFFER FULL (0,1 time) | SKIP AND EXIT ROUTINE

⊕

BUFFER FULL (0,1 time) | STORE CHARACTER IN BUFFER

This pre-test alternation description can be superimposed on the existing Warnier diagram to reflect the change made to the code. When you have tackled problem one, try to redraw the Warnier diagram so that the coding changes are mirrored in the Warnier description.

Solutions

The first part should have been easy! The character count when it reaches 255 will increment to zero; thus buffer overflow can be detected by the setting of the zero flag. A simple but effective solution is to use a conditional branch or jump immediately after the instruction that increments the character count. By jumping to the CLOSE$BUFFER label, any over-sized entry will be safely ignored. The necessary changes are similar on all three processors, so we'll illustrate the idea with the Z80 form (Fig 6).

The addition to the Warnier diagram is shown in Fig 7. The extra operations occur, as should be expected, immediately after the INCREMENT COUNT statement.

Data movement

To move data from a buffer area to its 'final resting place' involves an understanding of some of the ways that blocks of data may be moved around in memory. To give some ideas of the approaches used, we'll look at typical coding. We are primarily interested in moving data from an area whose starting address is fixed (that is, our text buffer) to an area whose starting address will vary as data is added. To move a block of data we need to know three things:

a) Where the data is to be obtained from.
b) Where the data is to be transferred to.
c) The size of the block to be transferred.

In other words, we need a source pointer, a destination pointer, and a count of the number of bytes to be

```
GET$WORD:       LDY   #0                    ;Initialise count

BUILD$STRING:   JSR   INPUT$ROUTINE         ;System call
                CMP   #CARRIAGE$RETURN      ;Is it a CR?
                BEQ   CLOSE$BUFFER
                INY                         ;Increment count
                STA   BUFFER$SPACE,Y        ;Store character
                JMP   BUILD$STRING          ;Back for next character

CLOSE$BUFFER:   STY   BUFFER$SPACE          ;Store character count
                RTS                         ;Return from subroutine
```

Fig 5 Get-word 6502 version one

```
GET$WORD:       LD    C,0                   ;Initialise count
                LD    HL,BUFFER$SPACE       ;Start of buffer

BUILD$STRING:   CALL  INPUT$ROUTINE         ;System call
                CP    CARRIAGE$RETURN       ;Is it a CR?
                JR    Z,CLOSE$BUFFER
                INC   C                     ;Increment count
                JR    Z,CLOSE$BUFFER        ;Z set + overflow
                INC   HL                    ;Increment pointer
                LD    (HL),A                ;Store character
                JR    BUILD$STRING          ;Back for next character

CLOSE$BUFFER:   LD    HL,BUFFER$SPACE       ;Need start address again
                LD    (HL),C                ;Store character count
                RET                         ;Return from subroutine
```

Fig 6 Get-word Z80 final version

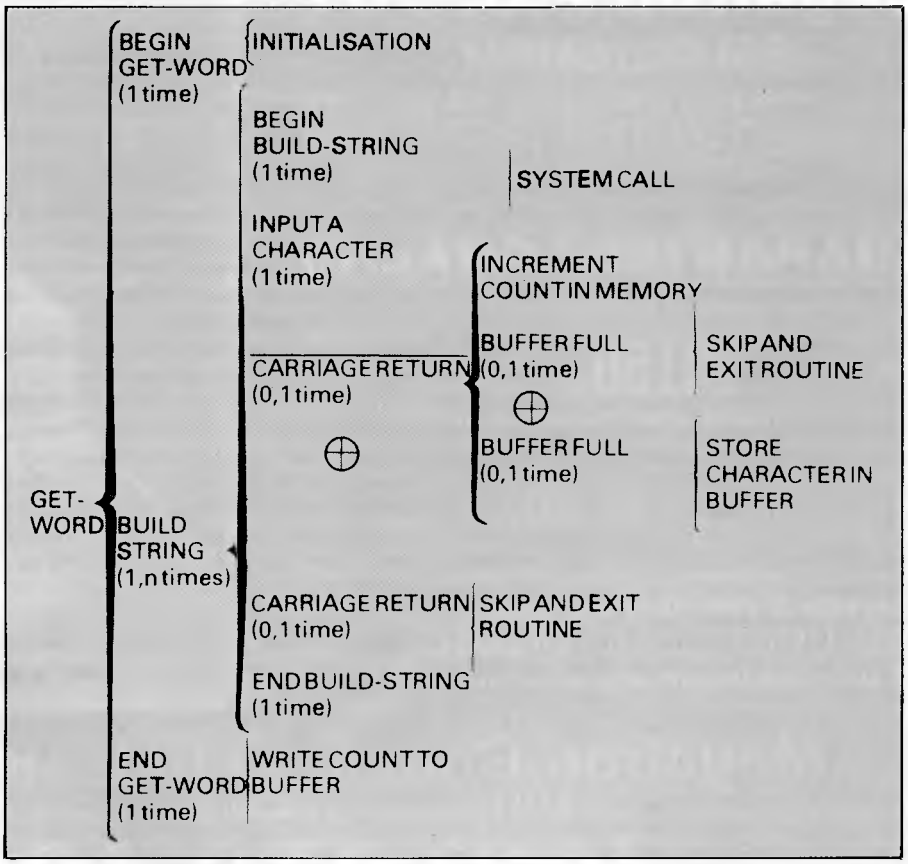

Fig 7 Final Warnier diagram

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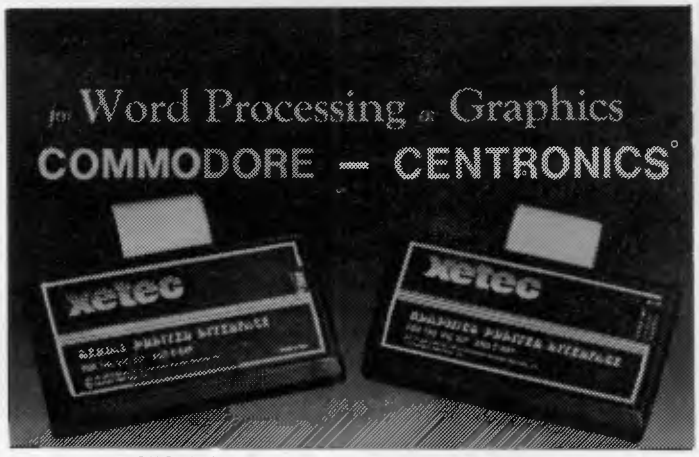

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```
ENTRY CONDITIONS:
HL = SOURCE START ADDRESS
DE = DESTINATION START ADDRESS
C  = NUMBER OF CHARACTERS TO BE TRANSFERRED

MOVE$BYTES: LD   A,(HL)          ;Get byte
            LD   (DE),A          ;Store byte
            INC  HL              ;Increment source pointer
            INC  DE              ;Increment destination pointer
            DEC  C               ;Decrease count
            JR   NZ,MOVE$BYTES
            RET                  ;Return from subroutine
```

Fig 8 Move block Z80 version

```
ENTRY CONDITIONS:
HL = SOURCE START ADDRESS
DE = DESTINATION START ADDRESS
C  = NUMBER OF CHARACTERS TO BE TRANSFERRED

MOVE$BYTES: MOV  A,M             ;Get byte
            STAX D               ;Store byte
            INX  H               ;Increment source pointer
            INX  D               ;Increment destination pointer
            DCR  C               ;Decrease count
            JNZ  MOVE$BYTES
            RET                  ;Return from subroutine
```

Fig 9 Move block 8080 version

```
ENTRY CONDITIONS:

HL = SOURCE START ADDRESS
DE = DESTINATION START ADDRESS
BC = NUMBER OF CHARACTERS TO BE TRANSFERRED

MOVE$BYTES: LDIR                 ;Automated block move
            RET                  ;Return from subroutine
```

Fig 10 Automated move block Z80

```
ENTRY CONDITIONS:

Y = NUMBER OF BYTES TO BE TRANSFERRED

DESTINATION ADDRESS DEFINED IN ZERO PAGE MUST BE ONE BYTE
BELOW THE INTENDED DESINTATION ADDRESS

MOVE$BYTES: LDA  SOURCE$ADDRESS-1,Y      ;Get byte
            STA  (DESTINATION$ADDRESS),Y ;Store byte
            DEY                          ;Decrease counter
            BNE  MOVE$BYTES
            RTS                          ;Return from subroutine
```

Fig 11 Move bytes 6502 version

transferred. On the 8080 and Z80, a byte of data may be transferred via the accumulator using HL as a source pointer and DE as a destination pointer. Thus the instructions needed on the 8080 are:

```
MOV A,M  ;Get byte
STAX D   ;Store byte
```

The equivalent Z80 instructions are written as:

```
LD A,(HL) ;Get byte
LD (DE),A ;Store byte
```

If a count of the number of bytes to be transferred is kept in the C register, a loop can be used to transfer up to 255 bytes from a source area to a destination area. A typical Z80 code is shown in Fig 8.

The 8080 version (Fig 9) incorporates the same ideas and should not prove too difficult to follow.

In the case of the Z80, a far more efficient alternative to the loops just described is available. The Z80 has incorporated in its instruction set some very powerful 'block move' instructions. In essence, the HL register pair is loaded as a source pointer, the DE pair as a destination pointer, and BC as a 16-bit byte counter. One such instruction using this pointer arrangement is the repeating block load with increment instruction whose mnemonic is LDIR. This instruction loads the contents of the byte addressed by HL into the location addressed by DE; HL and DE are then incremented and the BC pair decremented. If BC does not equal zero, the program counter is decreased by two and the instruction re-executed. The automated version of the Z80 loop shown earlier is given in Fig 10 for comparison.

On the 6502, we can move a specific byte from one address to another using the instructions:

```
LDA SOURCE$ADDRESS
STA DESTINATION$ADDRESS
```

This is all very well if only one byte is being moved and we know the addresses at the time we write the program, but when several bytes must be transferred, the indexed equivalent instructions may be used to move the Y'th byte of a page of data. The equivalent indexed forms are:

```
LDA SOURCE$ADDRESS,Y
STA DESTINATION$ADDRESS,Y
```

For the purpose of transferring data from a buffer such as we have described, we are particularly interested in moving data from a fixed base area (that is, the buffer area) to an area whose starting address may well vary (we could be transferring text into a dynamically changing 'string space' area). This being so, we will want to keep the destination address in two zero page locations and use indirect indexed addressing to define the destination address. The code that achieves this data movement will be of the form:

```
LDA SOURCE
    $ADDRESS,Y      ;Get byte
STA (DESTINATION
    $ADDRESS),Y     ;Store byte
```

One possible approach on the 6502 (Fig 11) is to use a backward counting loop to perform the above instructions Y times, decreasing the value of Y with each pass through the loop. As the loop that follows does not deal with the base address bytes themselves (that is, the case of Y=0), it's necessary to address the byte below the intended source start address. It's also important to ensure that the indirect pointer stored in the zero page is a pointer to the byte below the actual destination start address.

END

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NETWORK NEWS

Over to Peter Tootill and Steve Withers for an explanation of null modems, and gossip on what's happening in the networking world.

Remote CP/M bulletin boards

Remote CP/M systems are a bit different from normal bulletin board systems ('BBS'). The latter keep you very much at a distance from the computer's operating system and provide menus and submenus for you from which to choose options.

Remote CP/M, however, is just as the name implies. It's like sitting at the keyboard of a CP/M system. After an introductory message and the log on sequence, if any, you are invited to type in commands. These commands are normal CP/M commands.

The features of the BBS are provided by a set of programs that you can run by typing in their names. You can type DIR to see what programs are available; 'B:' to change the drive you are working from, and so on.

If you are not familiar with CP/M, 'Help' programs are available to assist you to use the system. One thing to remember is that 'control C' will normally get you out of your present action, and back to the main system prompt.

APC Show

Last month's report on the 3rd *APC* Show overlooked the bulletin board that was running on the MICOM stand. As arrangements weren't finalised until just before the Show, the phone number was not widely publicised. Despite this, the system attracted many callers, including several from interstate. There was even a message from a chap calling himself Bob Hawke . . .

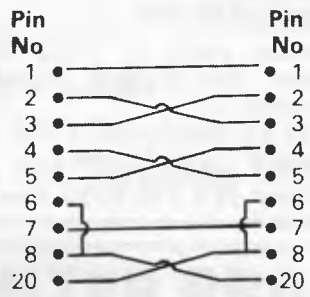
Null modems

A 'null modem' isn't really a modem at all. It's simply a device used to connect two systems; for example, where there would otherwise be some conflict of connection or other problem if a simple RS232 lead were used.

Usually, when computers are fitted with an RS232 port using a standard 25-pin plug, they transmit data on pin 2 and receive on pin 3. This is a problem if you want to connect two computers together to transfer a file between them. Each will be talking on pin 2 and listening on pin 3! You'll appreciate the problem!

The simple answer is to make up a lead that has the connections to pin 2 and 3 reversed. This is all that a null modem is.

In some systems there will be other connections to be made, but this depends more on the software. Some terminal software won't do any transmitting until it sees that a carrier is present, or that the modem is ready — or both. To get around this, just link a few more pins together to fool the computer into thinking that it's connected to a modem that is online to another. A typical set of connections for a null modem is given in Fig 1.



Signal	
Protective Ground	(PGND)
Transmit Data	(TD)
Receive Data	(RD)
Request to Send	(RTS)
Clear to Send	(CTS)
Data Set Ready	(DSR)
Signal Ground	(SGND)
Carrier Detect	(CD)
Data Terminal Ready	(DTR)

Fig 1 Details of typical connections for a 'null modem'

Null modems are usually made from two RS232 connectors and a small box so that they can receive normal RS232 cables. However, there is no reason why you shouldn't make up a whole lead connected in this manner.

Some systems, such as Peter's trusty old TRS-80 Model 1, have a switch to reverse the positions of pins 2 and 3 so that a null mode isn't necessary (unless the software needs one).

New boards

Another general interest bulletin board has opened in Sydney. The Prophet RBBS is available 24 hours a day thanks to Larry Lewis of LA and HM Lewis Computer Services Pty Ltd. The number is (02) 628 7030.

We also have news of two specialist boards. The Melbourne PC User Group (despite the name their particular interest lies in the IBM and compatibles) has a bulletin board on (03) 528 3750. Unfortunately we have no information on the hours of operation. TISHUG (Texas Instruments Sydney Home-computer User's Group) has also started a board for its members. As they sent us plenty of information we've reproduced it in an edited form.

TI.S.H.U.G.BBS

"With close on 1,000 members in this group, the need for a BBS was eminant. On Sunday, the 1st of July at 9pm, our BBS commenced with some very interesting features for those who have a TI home computer with RS232, terminal emulator II, and a modem (telephone coupler).

We are using the very latest model of the powerful Australian made UDM-1200 modem, by Modem Technology, plus a TI-99/4A computer with three disk drives, 128k memory card and other goodies.

Robert Crago, the author, and winner of the competition recently conducted to create this BBS software, has designed a two-part program. He was presented with a cheque to the value of $100.

Disk Drive#1 has software to download, Drive#2 contains message files, and Drive#3 holds 20 pages of news/views from around the world.

The 128k card contains a listing and checking file of user numbers and names. We use the TI-Writer (or editor assembler) to create news and message files at our end. Shane is able to monitor all operations at his end, chat facilities are hopefully to be included in this program.

This Electronic Bulletin Board will shortly become the very first BBS in the Southern Hemisphere to have full clear Spoken text as it is displayed on your screen. This means that if you have a TI Speech Synthesiser, your TI-99/4A will tell you all the information you wish to hear and read.

This system will be on during the following days and times. Do not try to

NETWORK NEWS

log on outside of these hours as the computer used for this BBS is used for the printing of our newsletter and personal use . . .
Sunday: 9am to 12 midnight (not on 2nd Sunday of the month).
Monday: 7am to 7pm then 8.30pm to midnight.
Tuesday: same as above.
Thursday: 7am to 10pm."

It seems that this BBS is intended for TISHUG members only, so please write to TISHUG, PO Box 149, Pennant Hills, NSW 2120 for more details.

We recently received a letter from someone who wishes to remain anonymous, telling us that several of the North American systems listed in network news have been disconnected. Our list is now a bit short, so if you know of any interesting systems in Canada or the USA, please let us know.

Our correspondent also provided a list of systems in the UK. We've weeded out those that we know have restricted hours, or are ring-back systems, but this still leaves several numbers for you to try. If you call any of these systems, please let us know what you find.

Prefix all numbers with 0011 44

300 Baud:	7073 28723
	6992 314
	703 437200
	243 511077
	742 754492
	602 289 783
	61 4273711
	903 42013
1200/75 Baud:	912 850131
	1 794 0611
	1 794 0655
	224 641 585

Australian systems

Micro design Lab RCPM

Telephone: (02) 663 0150. Hours: 5pm–7am weekdays. 24 hours weekends.

MI Computer Club BBS

Telephone: (02) 662 1686. Program downloading. Hours: 24 hours daily.

Sydney Public Access RCPM

Telephone: (02) 808 3536. System Operators: Barrie Hull and David Simpson. Hours: 24 hours daily.

Prophet RBBS

Telephone: (02) 628 7030. Operator: Larry Lewis. Hours: 24 hours daily.

TISHUG BBS

Members only. Write to TISHUG, PO Box 149, Pennant Hills, NSW 2120 for information.

MICOM RCPM CBBS

Telephone: (03) 762 5088. System Operator: Peter Jetson. Hours: 24 hours daily.

Sorcerer Computer Users Association CBBS

Telephone: (03) 836 4616. System Operator: Bruce Alexander. Program downloading for SCUA members. Hours: 24 hours daily.

Melbourne PC User Group

Telephone: (03) 528 3750.

Gippsland RCPM

Telephone: (051) 34 1563. System Operator: Bob Sherlock. Hours: 24 hours daily.

Software Tools RCPM

Telephone: (07) 378 9530. Hours: 24 hours daily.

Perth RMPM

Telephone: (09) 367 6068. Hours: 6pm–9pm WST.

Adelaide Micro User Group BBS

Telephone: (08) 271 2043. Hours: 10am–10pm, weekends and public holidays. 9am–9pm weekdays.

Computer Ventures CBBS

Telephone: (08) 255 9146. System Operator: Daniel Schumacher. Hours: 24 hours daily.

New Zealand Systems

NZ Micro Club RBBS

Telephone: 0011 64 9 762 309. System Operator: Chris Cotton. Hours: 24 hours daily. Software up/downloading.

This information is correct and current to the best of our knowledge. Please send corrections and updates to: Steve Withers, C/- *Australian Personal Computer*, 77 Glenhuntly Road, Elwood, Vic 3184.

Overseas systems

North America

SYSTEM	*NUMBER*	*NOTES*
SPACE Citadel	0011 1 206 839 4759	
Ckcms Citadel	0011 1 206 329 0436	
Eskimo North Minibin	0011 1 206 527 7638	
Conn-80	0011 1 212 441 3755	TRS-80 Color Computer

EUROPE

ELFA ABC-MONITOR, Sweden	0011 468 730 0706	Half Duplex
A8C-8anken, Sweden	0011 463 511 0771	
ABC-MONITOR, Sweden	0011 468 801 523	Password required
CBBSD Gothenburg	0011 463 129 2160	75/1200 baud
CBBS Sweden*	0011 463 169 0754	
BUG, Sweden	0011 468 463 528	BBC Micro
XD-BBS Helsinki	0011 358 072 2272	
Commodore BBS, Finland	0011 358 116 223	
Tedas, Munich	0011 49 89 596 422	
Decates, Germany	0011 49 66 154 51433	

UK

CBBS South West	0011 44 626 890 014	
Liverpool Mailbox	0011 44 51 428 8924	
BASUG	0011 44 742 667 983	
Computer Answers	0011 44 1 631 3076	
CBBS Surrey	0011 44 4862 25174	
Blandford Board	0011 44 258 54494	
Microweb TBBS	0011 44 61 456 4157	BBC Micro
Stoke Information Technology Centre RCPM	0011 44 782 265 078	

Africa

Connection 80, Cape Town	0011 27 21 457 750
TRShop, Cape Town	0011 27 21 5367
Clan Computers, Durban	0011 27 31 66356
Peters Computers, Johannesburg	0011 27 11 834 5134
Peters Computers, Johannesburg	0011 27 11 834 5135
War Games, Johannesburg	0011 27 11 642 3722

* After receiving the tone and connecting your modem, either type <C/R> or <COM C/R>. The system then asks for a password which is 'cbbs' in *lower-case* letters. If you only get a '>' from the system, it needs resetting, so type <I> C/R.

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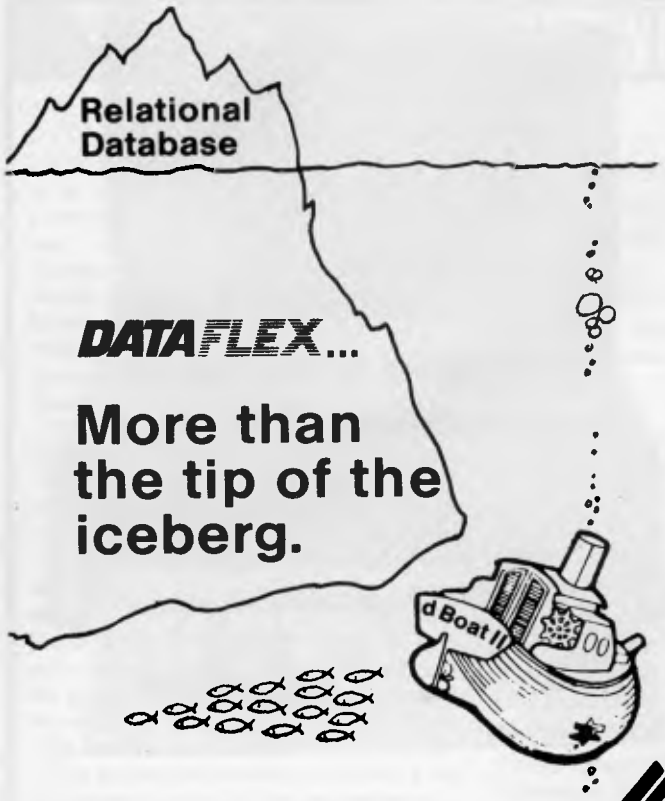

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PORTABLES COMPARISON CHART

Computer	Price for Basic Unit	RAM RDM	Weight	Processor	Keyboard	Display	Printer built-in	Communications: Software supplied
Apple IIc	$1,575 plus tax, $269 for video monitor	128k 16k	3.5kg without display	8-bit 65C02	62 keys	40/80 column 24 lines Video monitor LCD coming	NO	NO
HP-110	$US2,995 Aust. price not yet available	272k 393k	4kg microfloppy drive 2.4kg Thinkjet 2.4kg	16-bit 8086	61 typewriter 15 programmable	80 x 16 line LCD screen	NO	YES
Sharp PC-5000	$2,575 incl tax	128k 192k expands to 256k	4.3kg, 5.7kg with printer	16-bit 8088	57 full-size, 15 programmable	80 x 8 line LCD screen	YES	NO
Tandy Model 100	$699.95 for 8k version $899 for 24k Additional 8k RAM $150 installed	32k 32k	1.7kg	8-bit 80C85	56 full-size 9 function keys	40 x 8 line LCD screen video option	NO	YES
NEC PC-8201	$695 32k RAM cart. $384.99	96k 32k (maximum)	1.7kg	8-bit 80C85	57 full-size 9 function keys	40-8 line LCD screen	NO	YES
Epson PX-8	$1,300 (excl. tax) 60k RAM disk $404, 120k RAM disk $570	64k with 32k plus 60 or 120k 2 x 32k RAM disk modules	2.3kg	8-bit T84 (Z80)	59 plus 9 function	80 x 8 line LCD screen	NO	NO

PORTABLES COMPARISON CHART

Modem built-in/ recommended	Interfaces	Dimensions (w x d x h)	Power supply	Operation on battery charge	Mass Storage	Software supplied	Software distributed on
NO Apple direct connect Modern option	Joystick/mouse port, serial port, external disk port	286 x 310 x 60 mm	AC only with external power pack	—	5¼ inch disk drive built-in 143k per disk	ProDOS, Basic, utilities demonstrations	5¼ inch diskettes
NO HP-IL acoustic coupler option	RS-232C serial port, HP-IL interface HP-IL cards for IBM PC and HP-150	322 x 245 x 75 mm	Internal rechargeable batteries AC adapter	16 hours	RAM disk 3½ disk drive option 710k per disk	PAM Lotus 1-2-3 MemoMaker Terminal emulator	3½ inch microfloppy diskettes IBM PC diskettes
NO	RS-232C port serial port, system bus expansion	322 x 304 x 84 mm	Internal rechargeable batteries AC adapter	6 hours cartridges less less with printer	Bubble memory Basic 5¼ inch disk drive option	Bubble mem. 5¼ inch diskettes	MS-DOS cartridges, utilities
NO Sendata acoustic coupler option	Parallel port RS-232C port cassette port phone port, bar code reader port, expansion connection	300 x 215 x 40 mm	Four AA cells, not rechargeable AC adapter	20 hours for 8k version	Cassette recorder 5¼ inch disk drive option	Cassettes	Basic Text processor communications Address and schedule filing
NO Sendata acoustic coupler option	Parallel port RS-232C port cassette port two serial ports, bar code reader, expansion port	300 x 215 x 61 mm	Four AA cells, Nicad rechargable battery pack optional AC adapter	18 hours for 8k version	Cassette recorder 5¼ inch disk drive option	Cassettes	Basic Text processor communications Personal Applications kit for $5.70 extra
NO CX-21 acoustic coupler option	RS-232C port bar code reader analog/digital interface	297 x 216 x 48 mm	Rechargeable Nicad battery AC adapter	15 hours	Microcassette recorder built-in, 60k and 120k RAM disk options	Microcassettes	CP/M operating system, Portable WordStar, Portable Calc, Portable Scheduler

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- Automatic paper insertion.
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- On board memory buffer.

BENCHMARKS

A list of Benchmarks used when evaluating micros is given below. An explanation can be found in the February '84 issue.

```
100 REM Benchmark 1
110 PRINT "S"
120 FOR K=1 TO 1000
130 NEXT K
140 PRINT "E"
150 END
```

```
100 REM Benchmark 2
110 PRINT "S"
120 K=0
130 K=K+1
140 IF K<1000 THEN 130
150 PRINT "E"
160 END
```

```
100 REM Benchmark 3
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/K*K+K-K
150 IF K<1000 THEN 130
160 PRINT "E"
170 END
```

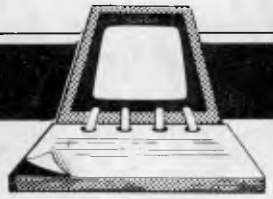
```
100 REM Benchmark 4
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 5
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 190
160 IF K<1000 THEN 130
170 PRINT "E"
180 END
190 RETURN
```

```
100 REM Benchmark 6
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB220
170 FORL=1 TO 5
180 NEXTL
190 IF K<1000 THEN 140
200 PRINT "E"
210 END
220 RETURN
```

```
100 REM Benchmark 7
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 230
170 FOR L=1 TO 5
180 M(L)=A
190 NEXTL
200 If K<1000 THEN 140
210 PRINT "E"
220 END
230 RETURN
```

```
100 REM Benchmark 8
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K^2
150 B=LOG(K)
160 C=SIN(K)
170 IF K<1000 THEN 130
180 PRINT "E"
190 END
```



DIARY DATA

Readers are strongly advised to check details with exhibition organisers before making travel arrangements to avoid wasted journeys due to cancellations, printer's errors, etc.

Hong Kong	SEARCC '84 Contact: John Lyons Tel: (062) 72 2514	September 24–28, 1984
Dallas, USA	PC World Expo Contact: Conference Management Group Tel: US (617) 879 0700	October 3–5, 1984
Berlin, Germany	Mikro Shop '84 Contact: AMK Berlin Austellungs-Messe-Kongress-GmbH Tel: (030) 3038 1	October 9–12, 1984
Melbourne	EPOS '84 Contact: Retail Management Development Program Tel: (03) 536 2386	October 15–18, 1984
Sydney	ACC '84 Contact: Beverley Parrot Tel: (02) 241 1478	November 5–9, 1984
Brisbane	Computer Expo '84 Contact: Robert Woodland Exhibitions Tel: (07) 372 3380	November 8–11, 1984

PROGRAMS

APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs to APC please include the following:
(a) A cassette or disk of the program.
(b) A listing on plain white paper (typewritten if no printer available).
(c) Comprehensive but brief documentation.
(d) A suitable SAE if you would like your materials to be returned after use.
Please mark (a), (b) and (c) with your name, address, program title, machine (state minimum RAM where appropriate) and — if possible — a daytime number. All programs are paid for at the rate of $20 per page of published listing. Send contributions to:
APC Programs, 77 Glenhuntly Road, Elwood, Vic 3184.

While sorting through programs for this section we were pleasantly surprised by the general standard, particularly of the games. In some cases these games are better than programs sent in for review by 'so-called' software houses.

This month's selection of games includes Star Scramble for the VIC, Defuse for the Commodore 64 and Conqueror for the TRS-80.

And finally we'd like to make a request to Apple owners for more listings. We receive mountains of listings for every machine except the Apple, so get off your . . .

Games
Scientific/mathematic
Business
Toolkit/utilities
Educational/Computer Aided Learning

Commodore 64 Defuse

by Greg Bernatek

This is a very good example of mine-field-type games where the object is to move about a grid in order to defuse bombs. Your progress is hindered by the fact that you can't walk on a square more than once and are killed if you touch a skull. However walking over a flag collects you a bonus.

As you move through the game's levels, the challenging aspect is how the number of bombs and skulls increases. To add to your enjoyment the 64 accompanies your exploits by playing 'The Entertainer'.

There is a bonus screen which appears in between each level, and here you must drop your man onto the only bottom row flag or a life will be lost.

The game requires a joystick plugged into port one; your man can move diagonally as well as in the four standard directions. The fire button is used to drop him in the bonus game.

At the end of the game you are given a rating which ranges from 'poor' to 'supernatural'.

```
10 REM        DEFUSE!
20 REM G. BERNATEK  11.1.84
30 POKE 52,48:POKE 56,48:CLR:PRINT"□"
40 POKE53280,0:POKE53281,0
50 REM SWITCH IN CHARACTER SET
60 GOSUB 9000
80 REM INITIALISE VARIABLES
85 FLAG=0
90 GOSUB 10000
110 REM DISPLAY TITLE PAGE
120 GOSUB 11000:GOSUB8500:REM GRID ON SCREEN
130 PRINT A0$;A1$
140 PRINT"
150 PRINT"
160 PRINTA3$
165 PRINT"
170 FOR I=1TO60:IFPEEK(JV)=239THEN210
```

$2880 INC TAX

256 k Twin Drives with the lot

Winchester Hard Disk Drive

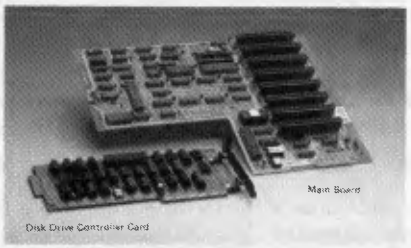
$1950 TAX PAID

BUFF "16" 16 BIT PERSONAL COMPUTER

- IBM PC compatible system
- Disk drive card: Either for internal or external use, can control up to 4 drives
- Microprocessor: 8088 Microprocessor
- Color/Graphic Adapter: Can drive RGB monitor, color monitor, B/W monitor
- Operation system: MS-DOS 2.0
- Low-profile detached keyboard
- MS-DOS Licensed by Microsoft Corporation

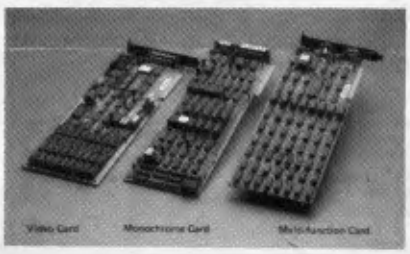
Low Profile Key Board
- Function key — 10 keys
- Numerical key — 15 keys
- Alpha/num key — 57 keys
- Cursor control key — 8 keys
- Other keys — 5 keys **$169**

Switching Mode Power Supply
- 135W output for main board and 2 pcs
- 5¼" floppy disk drive with fan inside
- Overload and short-circuit protection **$185**



Disk Drive Controller Card $170
- Can control 4 pcs 5¼" floppy disk drive
- Use SMC 9216 chip more reliable and access data quicker

Main Board $850
- XT upgrade version, 8 expansion slots, 8k ROM (Bios)
- MS-DDS licenced by Microsoft Corp.



$230

Monochrome Card
- Dot font 14 x 9 with parallel printer port
- 4-layer board

Video Card $360
- For RGB monitor, composite color and B/W monitor
- 100% IC socket 4 layer PCB

Multi-function Card $500
- 128k Ram built in, expandable to 256k
- 2 serial asynchronons communication ports (RS-232 interface)

MICRO ~ BUFF

TELEX AA 139718
TELEPHONE 277 7754 (ASK FOR RAY POPE)

499 HIGH STREET ROAD,
MT WAVERLEY 3150
MELBOURNE, VICTORIA,
AUSTRALIA

```
171 IFPEEK(197)=4THEN4000
175 NEXT
180 PRINT"
185 PRINTA2$
190 FOR I=1TO60:IF PEEK(JV)=239 THEN 210
191 IFPEEK(197)=4THEN4000
195 NEXT
200 GOTO 160
210 REM ENTER HERE FROM TITLES
220 C=0:POKE54+6,0:POKE54+24,15:POKE54+5,11:POKE54+4,0
230 GOSUB8600
240 REM TIME TICKS AWAY.....
250 TM=TM-1:IFTM=-1THENTM=0:C=0:GOSUB16300:GOTO230:REM DEATH MARCH
270 M9=PEEK(JV):M9=15-(M9AND15)
290 IFM9=1THEN5000:REM UP
300 IFM9=2THEN5200:REM DOWN
310 IFM9=4THEN5300:REM LEFT
320 IFM9=8THEN5400:REM RIGHT
330 IFM9=5THEN5500:REM UP & LEFT
340 IFM9=6THEN5600:REM DOWN & LEFT
350 IFM9=9THEN5700:REM UP & RIGHT
360 IFM9=10THEN5800:REM DOWN & RIGHT
370 IFPEEK(MP)<>65ANDPEEK(MP)<>32THENGOSUB7700
380 IFS1>HITHENHI=S1
390 GOSUB 8510
400 IFERR=1THENERR=0:GOTO7000:REM SKULL
405 IFERR=2THENERR=0:GOTO12000
410 POKEMP,80:POKEMP+1,81:POKEMP+40,82:POKEMP+41,83
420 GOTO240
3000 REM DELETE MAN OLD POSITION
3010 POKEMP,32:POKEMP+1,32:POKEMP+40,32:POKEMP+41,32
3050 RETURN
4000 REM INSTRUCTIONS FOR GAME
4005 POKE53272,23
4010 PRINT"
4020 PRINT"  GAME INSTRUCTIONS"
4030 PRINT"
4040 PRINT:PRINT"  YOU PLAY THE PART OF A BOMB DEFUSING
4050 PRINT" EXPERT.  YOUR MAN CAN MOVE IN ANY OF THE"
4060 PRINT" EIGHT DIRECTIONS WITH THE AID OF A JOY-"
4070 PRINT" STICK PLUGGED INTO PORT ONE."
4080 PRINT"  THERE ARE TWO STAGES TO THIS GAME.    "
4090 PRINT"1) THE BOMB DEFUSING GRID.  YOUR MAN MUST "
4100 PRINT" REACH THE BOMB BEFORE TIME RUNS OUT!"
4110 PRINT"       PRESS '-_-' FOR NEXT PAGE.
4120 IFPEEK(JV)<>239THEN4120
4125 PRINT"  THE AMOUNT OF BOMBS TO BE DEFUSED DEPE-"
4127 PRINT" NDS UPON WHAT SHEET YOU ARE ON !       "
4130 PRINT"2) THE FLAG DETECT STAGE.  TOP YOUR MAN "
4140 PRINT" ONTO THE FLAG, STANDING AMONGST THE    "
4150 PRINT" SKULLS.  IF YOU FALL ONTO A SKULL......."
4160 PRINT" THE GAME STARTS WITH THREE LIVES, BUT  "
4170 PRINT" UPON REACHING SHEET FIVE OR SHEET TEN   "
4180 PRINT" AN EXTRA ONE IS AWARDED."
4190 PRINT"       PRESS '-_-' FOR NEXT PAGE.
4200 IFPEEK(JV)<>239THEN4200
4205 POKE53272,29
4210 PRINT"   OBSTACLES AND SCORING."
4220 PRINT"
4230 PRINT"
4240 PRINT"  -I ..... 100 X TIME REMAINING."
4250 PRINT"  |\"
4260 PRINT"  V ..... 100 X TIME REMAINING."
4270 PRINT"  L\"
4280 PRINT"  /T ..... MINUS ONE LIFE."
4290 PRINT"   BONUS POINTS AWARDED FOR COMPLETING"
4300 PRINT" EACH SHEET. IT GETS HARDER & HARDER !"
4310 PRINT"       'FIRE' RETURNS TO TITLE PAGE.
4320 IFPEEK(JV)<>239THEN4320
4390 GOTO120
5000 REM MOVE UP
5010 IFPEEK(MP-80)>57THENGOSUB3000:MP=MP-80:GOSUB7770
5050 GOTO370
5200 REM MOVE DOWN
5210 IFPEEK(MP+80)<>32THENGOSUB3000:MP=MP+80:GOSUB7770
5250 GOTO370
5300 REM MOVE LEFT
5310 IFPEEK(MP-2)<>32THENGOSUB3000:MP=MP-2:GOSUB7770
5350 GOTO370
5400 REM MOVE RIGHT
5410 IFPEEK(MP+2)<>32THENGOSUB3000:MP=MP+2:GOSUB7770
5450 GOTO370
5500 REM MOVE UP & LEFT
5510 IFPEEK(MP-82)>57THENGOSUB3000:MP=MP-82:GOSUB7770
5550 GOTO370
5600 REM MOVE DOWN & LEFT
5610 IFPEEK(MP+78)<>32THENGOSUB3000:MP=MP+78:GOSUB7770
5650 GOTO370
5700 REM MOVE UP & RIGHT
5710 IFPEEK(MP-78)>57THENGOSUB3000:MP=MP-78:GOSUB7770
5750 GOTO370
5800 REM MOVE DOWN & RIGHT
5810 IFPEEK(MP+82)<>32THENGOSUB3000:MP=MP+82:GOSUB7770
5850 GOTO370
6000 REM END OF GAME
6010 PRINT"
6020 FORI=1TO2000:NEXT
6030 PRINT"
6035 FORI=1TO900:NEXT
6040 IFS1<5000THENPRINT"POOR"
6050 IFS1<10000ANDS1>5000THENPRINT"FAIR"
6060 IFS1<20000ANDS1>10000THENPRINT"AVERAGE"
6070 IFS1<30000ANDS1>20000THENPRINT"GOOD"
6080 IFS1<40000ANDS1>30000THENPRINT"V. GOOD"
6090 IFS1<50000ANDS1>40000THENPRINT"EXCELLENT"
```

PROGRAMS

```
6100 IFS1<60000ANDS1>50000THENPRINT"SUPURB"
6110 IFS1>70000ANDS1<60000THENPRINT"KING"
6115 IFS1>80000ANDS1<70000THENPRINT"MASTER"
6120 IFS1<90000ANDS1>80000THENPRINT"EMPORER"
6125 IFS1>100000THENPRINT"SUPERNATURAL"
6130 POKES+4,0:POKES+1,40:POKES+4,17
6140 FORI=1TO5000:NEXT:GOTO90
7000 REM WHOOPS! RAN INTO A SKULL!
7030 GOSUB16500:REM DEATH MARCH !
7040 POKEMP,80:POKEMP+1,81:POKEMP+40,82:POKEMP+41,83
7050 GOTO240
7700 REM MAN'S NEW POS.
7710 IFPEEK(MP)=69THENS1=S1+(TM*10):RETURN:REM FLAG
7720 IFPEEK(MP)=76THENERR=1:RETURN
7730 IFPEEK(MP)=72THENS1=S1+(TM*10):D=D+1:TM=45:IFS1>HITHENHI=S1
7740 IFD=LVTHENGOSUB8500:D=0:ERR=2:RETURN
7750 IFPEEK(MP)=72THENPOKEMP,80:POKEMP+1,81:POKEMP+40,82:POKEMP+41,83:GOSUB8680
7760 RETURN
7770 REM PLAY NEXT NOTE OF JINGLE
7780 C=C+1:IFC=82THENC=0
7790 POKES+4,0:POKES+1,TU(C):POKES+4,17
7999 RETURN
8500 REM PRINT SCORES
8510 PRINT"▓▓▓▓▓▓▓1 UP▓▓▓▓▓▓▓TIME▓▓▓▓▓▓▓▓ HI "
8520 PRINTTAB(6);S1;TAB(18);TM;"▮ ";TAB(29);HI
8530 PRINT"▓▓▓▓▓SHEET:";LV;"▓▓▓▓▓▓▓▓▓▓▓▓▓▓LIVES:";L
8590 RETURN
8600 REM SET UP SCREEN PHASE#1
8601 PRINT"▯"
8605 GOSUB11000:GOSUB8500
8610 MP=1483:POKEMP,80:POKEMP+I,81:POKEMP+40,82:POKEMP+41,83
8620 FORI=1TO(LV*2)
8630 X=INT(RND(1)*960)+1024
8635 Y=INT(RND(1)*960)+1024
8640 IFPEEK(X)<>65THEN8630
8645 IFPEEK(Y)<>65THEN8635
8650 POKEX,76:POKEX+1,77:POKEX+40,78:POKEX+41,79
8660 POKEY,69:POKEY+1,70:POKEY+40,67:POKEY+41,71
8670 NEXT I
8680 Z=INT(RND(1)*960)+1024
8690 IFPEEK(Z)<>65THEN8680
8700 POKEZ,72:POKEZ+1,73:POKEZ+40,74:POKEZ+41,75
8800 RETURN
9000 REM MOVE CHARACTER ROM INTO RAM
9001 REM    AT $3000  (12288 DEC)
9010 FOR I=832 TO 860:READ A:POKE I,A
9020 NEXT I
9030 POKE 56334,PEEK(56334)AND254
9040 POKE 1,PEEK(I)AND251
9050 SYS832
9060 POKE 1,PEEK(1)OR4
9070 POKE 56334,PEEK(56334)OR1
9080 FOR I=12808 TO 12991
9090 READ A:POKE I,A:NEXT I
9100 FOR I=12672 TO 12751
9110 READ A:POKE I,A:NEXT I
9120 POKE 53272,29
9190 RETURN
10000 REM VARIABLES
10010 A0$="▓▓▓▓▓ ↑|↑|↑|↑|↑|↑|↑D▓E▓F▓U▓S▓E▓!▓|↑|↑|↑|↑|↑|"
10020 A1$="▓▓▓▓▓▓▓ ↑|↑|GAME▓PROGRAMMED▓BY▓G.▓BERNATEK▓|↑|"
10025 A2$="▓▓▓▓▓▓▓▓▓▓▓▓ ────PRESS▓'F1'▓FOR▓INSTRUCTIONS▓─"
10030 A3$="▓▓▓▓▓▓▓▓▓▓▓▓▓ ────PRESS▓'FIRE'▓TO▓START▓──────"
10040 JV=56321:SC=1024:S=54272:C=1:S1=0:TM=45:LV=1:L=3:D=0
10050 IF FLAG=1 THEN RETURN
10055 DIM TU(81),DM(27)
10060 REM READ DATA INTO ARRAY TU
10070 FOR I=1 TO 81
10080 READ TU(I):NEXT I:FLAG=1
10090 FOR I=1 TO 27
10100 READ DM(I):NEXT I
10110 HI=0
10500 RETURN
11000 REM SET UP SCREEN
11010 PRINT"▓▓▓";
11020 FOR I=1TO10
11030 PRINT" ↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|↑|"
11040 PRINT" ──────────────────────────────────────"
11050 NEXT
11060 PRINT"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓D E F U S E !"
11100 RETURN
12000 REM SCREEN PHASE#2
12010 FORI=30TO120STEP.6
12020 POKES+4,0:POKES+1,I:POKES+4,33
12030 NEXTI
12040 SB=(LV*100):PRINT"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓SCREEN BONUS : ";LV"X 100"
12050 S1=S1+SB:IFS1>HITHENHI=S1
12060 FORI=110TO30STEP-.6
12070 POKES+4,0:POKES+1,I+INT(RND(1)*15):POKES+4,17
12080 NEXTI
12090 PRINT"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓";
12100 PRINT"L\L\L\L\L\L\L\L\L\L\L\L\L\L\L\L\L\L\L\"
12110 PRINT"ↅ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/Γ/"
12120 FP=INT(RND(1)*39)+1864
12125 IFPEEK(FP)<>76THEN12120
12130 POKEFP,69:POKEFP+1,70:POKEFP+40,67:POKEFP+41,71
12150 CC=160:TM=200*LV
12160 POKESC+CC,84:POKESC+CC+1,85:POKESC+CC+40,86:POKESC+CC+41,87
12170 POKESC+CC+S,7:POKESC+CC+1+S,7:POKESC+CC+40+S,7:POKESC+CC+41+S,7
12180 M9=PEEK(JV):FR=M9AND16
12190 IFFR=0THEN12310:REM DROP MAN
12200 IFPEEK(SC+CC+42)=76THEN15000
12280 POKESC+CC,32:POKESC+CC+1,32:POKESC+CC+40,32:POKESC+CC+41,32
12290 CC=CC+2:TM=TM-10:IFTM<0THENTM=0:GOSUB8500
12300 GOSUB8500:GOTO12160
12310 REM MAN DROPPED!
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12320 POKESC+CC,32:POKESC+CC+1,32:POKESC+CC+40,32:POKESC+CC+41,32
12330 CC=CC+40:IFSC+CC>1023ANDCC+SC<1863THEN12420
12350 POKES+4,0:POKES+1,255-(CC/10):POKES+4,33
12360 POKESC+CC,84:POKESC+CC+1,85:POKESC+CC+40,86:POKESC+CC+41,87
12370 POKESC+CC+S,7:POKESC+CC+1+S,7:POKESC+CC+40+S,7:POKESC+CC+41+S,7
12390 GOTO12310
12420 IFPEEK(SC+CC+40)=76THEN15000:REM SKULL!
12430 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■SCREEN BONUS :";TM
12440 S1=S1+TM:IFS1>HITHENHI=S1
12441 IFLV=5ORLV=10ORLV=15ORLV=20THENL=L+1
12445 LV=LV+1:GOSUB8500:TM=45
12450 FORI=110TO30STEP-.6
12460 POKES+4,0:POKES+1,I+INT(RND(1)*15):POKES+4,17
12470 NEXTI
12490 GOTO 210
15000 REM DROPPED ON A SKULL
15005 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■SORRY! NO BONUS!"
15007 IFLV=5ORLV=10ORLV=15ORLV=20THENL=L+1
15010 FORI=0TO8
15020 POKES+4,0:POKES+1,20:POKES+4,129:FORJ=1TO10
15030 POKE53280,7:NEXTJ:POKE53280,0:FORJ=1TO10:NEXTJ,I
15100 LV=LV+1
15110 FORI=1TO500:NEXT:POKES+4,0
15120 GOSUB 16500:GOTO210
16300 REM T.N.T. EXPLODES!
16310 POKES+4,0:POKES+1,10:POKES+4,129
16330 FORI=0TO8:POKE53280,7:FORJ=0TO30:NEXT:POKE53280,0:FORJ=0TO30:NEXTJ,I
16500 REM DEATH TUNE !
16505 POKES+6,240:POKES+5,0
16510 FORI=1TO27STEP3
16520 POKES+4,0:POKES+1,DM(I):POKES,DM(I+1):POKES+4,33
16530 FORJ=1TODM(I+2):NEXTJ,I
16540 POKES+4,0

16550 POKES+6,0:POKES+5,11
16560 TM=45
16570 L=L-1:IFL=0THEN6000
16590 RETURN
20000 REM   DATA FOR M/C ROUTINE THAT
20001 REM MOVES CHARACTER SET INTO RAM
20010 DATA162,8,160,0,173,0,208,141,0,48,238,69,3,238,72,3,136,208,241,238
20020 DATA70,3,238,73,3,202,208,232,96
21000 REM    CHARACTER DATA
21010 REM
21020 REM        GRID
21030 DATA0,127,127,127,127,127,127,127
21040 DATA0,254,254,254,254,254,254,254
21050 DATA127,127,127,127,127,127,127,127
21060 DATA254,254,254,254,254,254,254,254
21070 REM        FLAG
21080 DATA0,127,127,127,126,120,112,124
21090 DATA0,254,230,134,6,6,6,6
21100 DATA6,198,198,198,198,198,198,198
21110 REM          T.N.T.
21120 DATA0,127,111,118,94,110,124,120
21130 DATA0,254,246,110,122,110,62,30
21140 DATA112,96,96,96,112,120,126,127
21150 DATA14,6,6,6,14,30,126,254
21160 REM          SKULL
21170 DATA0,120,96,70,70,96,113,124
21180 DATA0,30,6,98,98,6,142,62
21190 DATA124,102,67,96,124,96,67,111
21200 DATA62,102,194,6,62,6,194,246
21210 REM      MAN (REV)
21220 DATA0,120,114,98,113,125,120,112
21230 DATA0,30,78,70,142,190,30,14
21240 DATA112,120,120,121,121,113,97,127
21250 DATA14,30,30,158,158,142,134,254
21260 REM      MAN (NON-REV)
21270 DATA0,7,13,29,14,2,7,15
21280 DATA0,224,176,184,112,64,224,240
21290 DATA15,7,7,6,6,14,30,0
21300 DATA240,224,224,96,96,112,120,0

21310 REM      NUMBERS 0-9
21320 DATA60,126,102,102,102,126,60,0
21330 DATA56,120,120,56,56,124,124,0
21340 DATA60,126,6,60,96,126,126,0
21350 DATA60,126,6,30,6,126,60,0
21360 DATA96,96,96,108,126,62,12,0
21370 DATA62,126,96,126,6,126,124,0
21380 DATA62,126,96,126,102,126,124,0
21390 DATA126,126,14,28,28,56,56,0
21400 DATA60,126,102,60,102,126,60,0
21410 DATA60,126,102,62,6,126,60,0
22000 REM  DATA FOR GAME JINGLE
22005 REM    READ INTO ARRAY TU
22010 DATA33,37,39,42,67,42,67,42,67
22020 DATA67,75,79,84,67,75,85,63,75,67
22030 DATA37,39,42,67,42,67,42,67
22040 DATA56,53,50,47,56,67,84,75,67,56,75
22050 DATA37,39,42,67,42,67,42,67
22060 DATA67,75,79,84,67,75,85,63,75,67
22070 DATA67,75,84,67,75,84,67,75,67,84,67,75,84,67,75,67,84,67,75,84,63
22080 DATA75,67,50,33
22100 REM  DATA FOR DEATH JINGLE
22110 REM    READ INTO ARRAY DM
22120 DATA16,195,550,15,210,600,10,143,800,11,218,250,12,143,250,11,218,250
22130 DATA10,143,250,9,247,250,10,143,700


READY.
```

BBC Mindwaves

by Brian Haines

'Mindwaves' is a program for the BBC Micro. It was inspired by the review of Brainstorm which appeared in the February issue of *APC*.

The purpose of Mindwaves is to help the user organise his thoughts and put them in a structured form; this is done by a series of structured headings.

Each heading is a parent for a number of children and so a tree structure is formed. The user moves about the tree at will entering thoughts as they occur; the program structures them into a continuous stream.

The program has many uses ranging from organising the outline of an article, defining the structure of a program, through to creating an address book.

Mindwaves compares favourably with Brainstorm, considering that it's written for the BBC and not a 16-bit CP/M micro. There are a few omissions which include the lack of wild card searches, namesakes and the incorporation of only one printer configuration, the Epson.

However it is still a monster program using nearly all the Beeb's memory. In fact there is only enough space left for a hundred lines — thoughts or addresses of 80 characters' length.

```
   10 MODE7
   20 PROCintro
   30 VDU6,3,12,15
   40 PROCdisplay
   50 PROCmenu
   60 END
   70 REM delete lines like this, line 80, and line 90 to save space, and X% can
 be increased to 150 (see line 140)
   80       ************************
   90             PROCintro
  100       ************************
  110 DEFPROCintro
  120 *KEY10D.|MRUN|M
  130 ONERRORGOTO30
  140 F%=0:N%=0:E%=0:X%=100:Y%=0:CP%=0
  150 DIMdata$(X%),PAR%(X%),CHILD%(X%),LSIB%(X%),RSIB%(X%),RANK%(X%),FP%(X%)
  160 FORI%=0TOX%:data$(I%)=STRING$(80," "):data$(I%)="":CHILD%(I%)=-1:LSIB%(I%)
=-1:RSIB%(I%)=-1:PAR%(I%)=-1:NEXT
  170 A$=STRING$(80," "):a$=A$:B$=A$
  180 A$="":a$="":B$=""
  190 REPEATINPUTLINE''"What title will you give this sheet?"''A$:UNTILLENA$<81
  200 PROCstore(A$,0,-1,-1,-1,1)
  210 ENDPROC
  220       ********************
  230           PROCheader
  240       ********************
  250 DEFPROCheader(hdr%)
  260 VDU28,0,3,30,0,12
  270 PRINT:hdr%::PROCpp(data$(hdr%),30,3):VDU26
  280 PROCline(3)
  290 ENDPROC
  300      ************************
  310              PROCstore
  320      ************************
  330 DEFPROCstore(text$,par%,child%,lsib%,rsib%,rank%)
  340 data$(F%)=text$:PAR%(F%)=par%:CHILD%(F%)=child%:LSIB%(F%)=lsib%:RSIB%(F%)=
rsib%:RANK%(F%)=rank%
  350 OF%=F%
  360 IFFP%(F%)<1 N%=F%+1 ELSE N%=FP%(F%)
  370 FP%(F%)=N%
  380 F%=N%
  390 IFF%>X% THENPROCinwind:PRINT"Last line used":VDU7,26
  400 ENDPROC
  410       ********************
  420           PROCcmd
  430       ********************
  440 DEFPROCcmd
  450 LOCALI%
  460 FORI%=0TO24:PRINTTAB(31,I%)"|"::NEXT
  470 VDU28,32,24,39,0,12
  480 PRINT''''"SAVE""LOAD" "DIG""CLIMB""DELETE""INSERT""AMEND""ORDER""PR
INT""LIST" "COPY"
  490 PRINT"HUNT" "REPLACE" "PROMOTE" "DEMOTE" "SPOOL"
  500 VDU26
  510 ENDPROC
  520       ********************
  530             PROCdisplay
  540       ********************
  550 DEFPROCdisplay
  560 VDU23;10,32,0;0;0;
  570 PROCheader(CP%)
  580 PROCline(20)
  590 PROCcmd
  600 VDU28,0,18,30,5,12
  610 k%=CHILD%(CP%)
  620 REPEAT:IFk%>-1 THENPRINT:k%::PROCpp(data$(k%),30,3):k%=RSIB%(k%)
  630   UNTILk%=-1
  640 VDU26,23;10;0;0;0;
  650 ENDPROC
  660       ********************
  670           PROCline
```

```
  680       ********************
  690 DEFPROCline(n%)
  700 PRINTTAB(0,n%)STRING$(30,"_")
  710 ENDPROC
  720       ********************
  730           PROCmenu
  740       ********************
  750 DEFPROCmenu
  760 Y%=9:REPEATPRINTTAB(31,Y%);
  770   *FX4 1
  780   REPEAT
  790     A%=INKEY(0):UNTILA%<>-1
  800    IFA%=138ANDY%<19 Y%=Y%+1:PRINTTAB(31,Y%);
  810    IFA%=139ANDY%>4 Y%=Y%-1:PRINTTAB(31,Y%);
  820    IFA%=135 THEN PROCcommand(Y%):PRINTTAB(31,Y%);
  830    UNTILFALSE
  840 ENDPROC
  850       ********************
  860           PROCcommand
  870       ********************
  880 DEFPROCcommand(n%)
  890 IFn%=4 THEN PROCsave
  900 IFn%=5 THEN PROCload:CP%=0:PROCdisplay
  910 IFn%=6 THEN PROCdig("Please give the new parent number")
  920 IFn%=7 THEN PROCclimb
  930 IFn%=8 THEN PROCdeletethis
  940 IFn%=9 THEN PROCinsert
  950 IFn%=10 THEN PROCamend
  960 IFn%=11 THEN PROCorder
  970 IFn%=12 THEN VDU2,21:PROCprint(0):VDU6,3
  980 IFn%=13 THEN PROCinwind:PRINT"Press S to stop listing":VDU23;10,32,0;0;0;2
8,0,18,30,5,12,14:PROClist(0):PROCinwind:VDU15,26,23;10;0;0;0;
  990 IFn%=14 THEN PROCcopy
 1000 IFn%=15 THEN PROChunt
 1010 IFn%=16 THEN PROCreplace
 1020 IFn%=17 THEN PROCpromote
 1030 IFn%=18 THEN PROCdemote
 1040 IFn%=19 THEN PROCascii
 1050 ENDPROC
 1060       ********************
 1070            PROCpp
 1080       ********************
 1090 DEFPROCpp(text$,width%,offset%)
 1100 IFwidth%-offset%<3 offset%=width%-3
 1110 LOCALI%,J%
 1120 REPEATI%=width%-offset%
 1130   IFMID$(text$,J%+I%,1)<>" "ANDJ%+I%<LENtext$THENREPEAT I%=I%-1:UNTILMID$(
text$,J%+I%,1)=" "ORI%=0
 1140   IFI%=0 I%=width%-offset%
 1150   PRINTTAB(offset%)MID$(text$,J%,I%):J%=J%+I%
 1160   UNTILJ%>=LENtext$
 1170 ENDPROC
 1180       ***********************
 1190              PROCdelete
 1200       ***********************
 1210 DEFPROCdelete(n%)
 1220 IFn%=0 THEN ENDPROC
 1230 IFLSIB%(n%)<>-1ANDRSIB%(n%)<>-1 LSIB%(RSIB%(n%))=LSIB%(n%):RSIB%(LSIB%(n%)
)=RSIB%(n%)
 1240 IFLSIB%(n%)<>-1ANDRSIB%(n%)=-1 RSIB%(LSIB%(n%))=-1
 1250 IFLSIB%(n%)=-1ANDRSIB%(n%)<>-1 CHILD%(PAR%(n%))=RSIB%(n%):LSIB%(RSIB%(n%))
=-1
 1260 IFLSIB%(n%)=-1ANDRSIB%(n%)=-1 CHILD%(PAR%(n%))=-1
 1270 FP%(n%)=F%:F%=n%
 1280 IFCHILD%(n%)<>-1 THENPROCfp(CHILD%(n%))
 1290 ENDPROC
 1300       ********************
 1310           PROCfp
 1320       ********************
 1330 DEFPROCfp(n%)
 1340 FP%(n%)=F%:F%=n%
 1350 IFCHILD%(n%)=-1 AND RSIB%(n%)=-1 THEN ENDPROC
 1360 IFCHILD%(n%)<>-1 THENPROCfp(CHILD%(n%))
 1370 IFRSIB%(n%1<>-1 THENPROCfp(RSIB%(n%))
 1380 CHILD%(n%)=-1
 1390 ENDPROC
 1400       ********************
 1410            PROCinsert
 1420       ********************
 1430 DEFPROCinsert
 1440 PROCinwind
 1450 REPEATINPUTLINEa$:UNTILLENa$<81
 1460 IFCHILD%(CP%)=-1 CHILD%(CP%)=F%:PROCstore(a$,CP%,-1,-1,-1,RANK%(CP%)+1):VD
U12,26:PROCdisplay:ENDPROC
 1470 k%=CHILD%(CP%)
 1480 REPEAT:IFk%>-1 lpar%=k%:k%=RSIB%(k%)
 1490   UNTILk%=-1
 1500 RSIB%(lpar%)=F%
 1510 PROCstore(a$,CP%,-1,lpar%,-1,RANK%(CP%)+1):VDU12,26:PROCdisplay:ENDPROC
 1520       ********************
 1530            PROCdig
 1540       ********************
 1550 DEFPROCdig(T$)
 1560 LOCALA%
 1570 PROCinwind
 1580 REPEATPROCpp(T$,30,0):INPUTA%:UNTILPAR%(A%)<>-1
 1590 CP%=A%:VDU12,26:PROCdisplay
 1600 ENDPROC
 1610       ********************
 1620            PROCclimb
 1630       ********************
 1640 DEFPROCclimb
 1650 IFCP%=0 THEN ENDPROC
 1660 CP%=PAR%(CP%):PROCdisplay:ENDPROC
 1670       ********************
 1680          PROCdeletethis
 1690       ********************
```

PROGRAMS

```
 1700 DEFPROCdeletethis
 1710 PROCinwind
 1720 INPUT"Enter the number of the line to be deleted"A%
 1730 VDU12,26
 1740 PROCdelete(A%)
 1750 PROCdisplay
 1760 ENDPROC
 1770      ********************
 1780            PROClist
 1790      ********************
 1800 DEFPROClist(a%)
 1810 PRINT;a%;:PROCpp(data$(a%),29,RANK%(a%)*2+1)
 1820 FORA=0TO50:NEXT
 1830 A$=""
 1840 *FX15 1
 1850 IFINKEY(-82)THENPROCinwind:PRINT''"Press R to restart" 'or E to exit"''or a
ny key to continue":REPEATA$=GET$:UNTILA$<>"S":VDU;2,28,0,18,30,5
 1860 IFA$="E" THENENDPROC
 1870 IFA$<>"" THENCLS
 1880 IFA$="R" THENa%=0
 1890 IFCHILD%(a%)=-1 ANDRSIB%(a%)=-1THENENDPROC
 1900 IFCHILD%(a%)<>-1 THENPROClist(CHILD%(a%))
 1910 IFRSIB%(a%)<>-1 THENPROClist(RSIB%(a%))
 1920 ENDPROC
 1930      ********************
 1940           PROCsave
 1950      ********************
 1960 DEFPROCsave
 1970 PROCinwind
 1980 X=OPENOUT("WAVES"+LEFT$(data$(0),5))
 1990 *OPT1,1
 2000 PROCsave2(0)
 2010 K%=F%
 2020 REPEATPRINT#X,K%:K%=FP%(K%):UNTILK%<1
 2030 CLOSE#X
 2040 VDU12,26
 2050 ENDPROC
 2060      ********************
 2070           PROCsave2
 2080      ********************
 2090 DEFPROCsave2(i%)
 2100 PRINT#X,i%,data$(i%),PAR%(i%),CHILD%(i%),LSIB%(i%),RSIB%(i%),RANK%(i%)
 2110 IFCHILD%(i%)=-1 ANDRSIB%(i%)=-1 THENENDPROC
 2120 IFCHILD%(i%)<>-1 THENPROCsave2(CHILD%(i%))
 2130 IFRSIB%(i%)<>-1 THENPROCsave2(RSIB%(i%))
 2140 ENDPROC
 2150      ******************
 2160           PRDCorder
 2170      ******************
 2180 DEFPROCorder
 2190 PROCdig("Please give the number of the parent of the lines you wish to ord
er")
 2200 PROCinwind
 2210 IFCHILD%(CP%)=-1 THENPRINT"No descendents":PROCdisplay:ENDPROC
 2220 REPEATINPUT"Give the number of the line to be moved "a%:UNTILPAR%(a%)=CP%A
NDa%<>0
 2230 CLS:REPEATPROCpp("Give the number of the line it should follow, or type 'F
  if it is to be first",30,0):INPUTA$
 2240   UNTIL(A$="F" AND CHILD%(CP%)<>a%) OR(VALA$<>0 ANDPAR%(VALA$)=CP%)
 2250 IFRSIB%(a%)<>-1 LSIB%(RSIB%(a%))=LSIB%(a%)
 2260 IFLSIB%(a%)<>-1 RSIB%(LSIB%(a%))=RSIB%(a%)
 2270 IFA$="F" LSIB%(a%)=-1:RSIB%(a%)=CHILD%(CP%):LSIB%(CHILD%(CP%))=a%:CHILD%(C
P%)=a%
 2280 IFA$<>"F" ANDCHILD%(CP%)=a% CHILD%(CP%)=RSIB%(a%)
 2290 IFA$<>"F" LSIB%(a%)=VALA$:RSIB%(a%)=RSIB%(VALA$):t%=RSIB%(VALA$):RSIB%(VAL
A$)=a%:IFt%<>-1 LSIB%(t%)=a%
 2300 VDU12,26:PROCdisplay
 2310 ENDPROC
 2320      ******************
 2330           PROCamend
 2340      ******************
 2350 DEFPROCamend
 2360 PROCinwind
 2370 REPEATINPUT"Which line number ",a%:UNTILPAR%(a%)=CP%
 2380 REPEATCLS:INPUTLINE"New text: "a$:UNTILLENa$<81:data$(a%)=a$
 2390 VDU12,26:PROCdisplay:ENDPROC
 2400      ********************
 2410           PROCload
 2420      ********************
 2430 DEFPROCload
 2440 PROCinwind
 2450 PROCpp("Please give the name of the sheet to be loaded (ignore the 'WAVES'
)",30,0):INPUTLINEA$:A$=LEFT$(A$,5)
 2460 VDU12,30
 2470 *OPT1,1
 2480 X=OPENIN("WAVES"+A$)
 2490 PROCload2(0)
 2500 INPUT#X,F%
 2510 K%=F%
 2520 REPEATINPUT#X,FP%(K%):K%=FP%(K%):UNTILEOF#X:FP%(K%)=-1
 2530 CLOSE#X
 2540 VDU12,26
 2550 ENDPROC
 2560      ********************
 2570           PROCload2
 2580      ********************
 2590 DEFPROCload2(i%)
 2600 INPUT#X,i%,data$(i%),PAR%(i%),CHILD%(i%),LSIB%(i%),RSIB%(i%),RANK%(i%)
 2610 IFCHILD%(i%)=-1 ANDRSIB%(i%)=-1 THENENDPROC
 2620 IFCHILD%(i%)<>-1 THENPROCload2(CHILD%(i%))
 2630 IFRSIB%(i%)<>-1 THENPROCload2(RSIB%(i%))
 2640 ENDPROC
 2650      ********************
 2660           PROCcopy
 2670      ********************
 2680 DEFPROCcopy
 2690 PROCinwind
```

PROGRAMS

```
 2700 REPEATPROCpp("Which line is to be copied?",30,0):INPUTA%:UNTILPAR%(A%)>0
 2710 REPEATPROCdig("Please give the number of its new parent line"):UNTILRANK%(
CP%)=RANK%(A%)-1
 2720 C%=CHILD%(CP%):OC%=-1
 2730 ch%=0:IFC%=-1 ch%=TRUE ELSEREPEAT OC%=C%:C%=RSIB%(C%):UNTILC%=-1
 2740 PROCstore(data$(A%),CP%,-1,OC%,-1,RANK%(CP%)+1)
 2750 IFch% CHILD%(CP%)=OF% ELSERSIB%(OC%)=OF%
 2760 IFCHILD%(A%)>0 THENCHILD%(OF%)=F%:PROCcopy2(CHILD%(A%))
 2770 VDU28,0,18,30,5,12,14:PROClist(0):VDU26,15
 2780 ENDPROC
 2790       ********************
 2800            PROCcopy2
 2810       ********************
 2820 DEFPROCcopy2(n%)
 2830 IFRSIB%(OF%)=F%THENPROCstore(data$(n%),PAR%(OF%),-1,OF%,-1,RANK%(OF%))ELSE
PROCstore(data$(n%),OF%,-1,-1,-1,RANK%(OF%)+1)
 2840 IFCHILD%(n%)>0 THENCHILD%(OF%)=F%:PROCcopy2(CHILD%(n%))
 2850 IFRSIB%(n%)>0 THENRSIB%(OF%)=F%:PROCcopy2(RSIB%(n%))
 2860 ENDPROC
 2870       ******************
 2880            PROCsearch
 2890       ******************
 2900 DEFPROCsearch(I%,A$,B$)
 2910 IFLENdata$(I%)>=LENA$ THENIFINSTR(data$(I%),A$) THEN PROCswitch(I%,A$,B$):
IFFNquestion THEN ENDPRDC
 2920 IFCHILD%(I%)=-1 ANDRSIB%(I%)=-1 THENENDPROC
 2930 IFCHILD%(I%)<>-1 THENPROCsearch(CHILD%(I%),A$,B$)
 2940 IFRSIB%(I%)<>-1 THENPROCsearch(RSIB%(I%),A$,B$)
 2950 ENDPROC
 2960       ******************
 2970            FNquestion
 2980       ******************
 2990 DEFFNquestion
 3000 CLS:CP%=PAR%(I%):PROCdisplay:PROCinwind:PROCpp(A$+" FOUND at line "+STR$(I
%)+".  Search this branch further (Y/N)?",30,0)
 3010 *FX15 1
 3020 =GET$="N"
 3030       ******************
 3040            PROChunt
 3050       ******************
 3060 DEFPROChunt
 3070 PROCinwind
 3080 PROCpp("Please give the text to be found",30,0):INPUTA$
 3090 PROCsearch(0,A$,"")
 3100 VDU12,26:PROCdisplay
 3110 ENDPROC
 3120       ******************
 3130            PROCinwind
 3140       ******************
 3150 DEFPROCinwind:VDU28,0,24,30,21,12:ENDPROC
 3160       ******************
 3170            PROCreplace
 3180       ******************
 3190 DEFPROCreplace
 3200 PROCinwind
 3210 PROCpp("Please give the text to be replaced",30,0):INPUTLINEA$
 3220 CLS:PROCpp("Please give the text to be inserted",30,0):INPUTLINEB$
 3230 PROCsearch(0,A$,B$)
 3240 VDU12,26:PROCdisplay
 3250 ENDPROC
 3260       ******************
 3270            PROCswitch
 3280       ******************
 3290 DEFPROCswitch(I%,A$,B$)
 3300 IFB$="" THEN ENDPROC
 3310 data$(I%)=LEFT$(LEFT$(data$(I%),INSTR(data$(I%),A$)-1)+B$+RIGHT$(data$(I%)
LEN(data$(I%))-INSTR(data$(I%),A$)-LENA$+1),80)
 3320 ENDPROC
 3330       ******************
 3340            PROCprint
 3350       ******************
 3360 DEFPROCprint(a%)
 3400 PROCpp(data$(a%),80,RANK%(a%))
 3410 IFCHILD%(a%)=-1 ANDRSIB%(a%)=-1THENENDPROC
 3420 IFCHILD%(a%)<>-1 THENPROCprint(CHILD%(a%))
 3430 IFRSIB%(a%)<>-1 THENPROCprint(RSIB%(a%))
 3440 ENDPROC
 3450
 3460       ********************
 3470            PROCpromote
 3480       ********************
 3490 DEFPROCpromote
 3500 PROCinwind
 3510 PROCpp("Please give the number of the line to be promoted",30,0):REPEATINP
UTA%:UNTILPAR%(A%)>0
 3520 T%=PAR%(A%):S%=RSIB%(T%):IFS%>0THENREPEATT%=S%:S%=RSIB%(S%):UNTILS%=-1
 3530 RSIB%(T%)=F%
 3540 PROCstore(data$(A%),PAR%(PAR%(A%)),-1,T%,-1,RANK%(A%)-1)
 3550 IFCHILD%(A%)>0 THEN CHILD%(OF%)=F%:PROCcopy2(CHILD%(A%))
 3560 PROCdelete(A%)
 3570 VDU12,26:PROCdisplay
 3580 ENDPROC
 3590       ********************
 3600            PROCdemote
 3610       ********************
 3620 DEFPROCdemote
 3630 PROCinwind
 3640 PROCpp("Please give the number of the line to be demoted",30,0):REPEATINPU
TA%:UNTILPAR%(A%)>-1AND(LSIB%(A%)>0ORRSIB%(A%)>0):T%=-1:S%=CHILD%(CHILD%(PAR%(A%
)))
 3650 IFS%>0 THENREPEATT%=S%:S%=RSIB%(S%):UNTILS%=-1
 3660 IFLSIB%(A%)=-1 CHILD%(PAR%(A%))=RSIB%(A%)
 3670 PROCstore(data$(A%),CHILD%(PAR%(A%)),-1,T%,-1,RANK%(A%)+1)
 3680 IFCHILD%(A%)>0 THEN CHILD%(OF%)=F%:PROCcopy2(CHILD%(A%))
 3690 IFT%>0 RSIB%(T%)=OF% ELSECHILD%(CHILD%(PAR%(A%)))=OF%
 3700 PROCdelete(A%)
 3710 VDU12,26:PROCdisplay
```

LATE NEWS: REVELATION has just received top honours from large U.S. Micro Magazine database review!

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- Up to 64000 characters per field
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.....

Computer Make & Model: .....

```
3720 ENDPROC
3730       *****************
3740          PROCascii
3750       *****************
3760 DEFPROCascii
3770 VDU26,12
3780 *SPOOL"asciiwaves"
3790 PROCascii2(0)
3800 *SPOOL
3810 CLS
3820 PROCdisplay
3830 ENDPROC
3840       *****************
3850          PROCascii2
3860       *****************
3870 DEFPROCascii2(n%)
3880 PRINTdata$(n%)
3890 IFCHILD%(n%)<1ANDRSIB%(n%)<1THEN ENDPROC
3900 IFCHILD%(n%)>0THENPROCascii2(CHILD%(n%))
3910 IFRSIB%(n%)>0THENPROCascii2(RSIB%(n%))
3920 ENDPROC
```

Gothic and Greek

by K Hewson

K Hewson has written a program that will take your micro back to the middle ages by creating a character set for the unexpanded VIC 20 in the Gothic style. He has also redefined the character set into the Greek alphabet for any aspiring philosophers.

When the program is run 'Please wait' will appear on the screen while the characters are redefined. Then the words on the screen will take on their new design. Typing RUN STOP RESTORE will return the VIC to the normal character set and typing POKE 36809,255 will bring back the Gothic or Greek letters.

The letters could be of particular use in adventure games where they can look very effective and set the mood perfectly.

```
10 PRINT"□PLEASE WAIT"
20 POKE51,255:POKE52,27:POKE55,
   255:POKE56,27
30 FORI=0TO511
40 POKE7168+I,PEEK(32768+I):NEXT
50 FORI=0TO(26*8-1):READA:T=T+A
60 POKE7168+I+(1*8),A:NEXT
65 IFT<>11394THENPRINT"DATA ERROR
     - PLEASE   CHECK":STOP
70 PRINT"□":POKE36869,255
1000 DATA64,184,36,36,60,36,37,66
1010 DATA104,52,36,40,36,36,188,64
1020 DATA12,178,80,16,16,16,18,12
1030 DATA112,136,84,20,20,20,42,48
1040 DATA36,90,16,28,16,18,28,32
1050 DATA72,180,32,56,32,32,160,96
1060 DATA12,178,80,16,22,18,18,12
1070 DATA64,64,36,36,60,36,165,66
1080 DATA16,42,12,8,8,8,42,20
1090 DATA16,42,12,8,8,40,72,48
1100 DATA72,164,40,48,40,36,164,64
1110 DATA64,160,32,32,32,36,34,60
1120 DATA84,170,42,42,34,34,42,68
1130 DATA68,178,50,42,42,38,38,66
1140 DATA88,164,36,36,36,36,36,24
1150 DATA88,164,36,36,56,32,32,64
1160 DATA88,164,36,36,32,44,37,26
1170 DATA88,164,36,40,52,36,37,66
1180 DATA88,164,32,24,4,68,36,24
1190 DATA16,42,12,8,8,8,8,16
1200 DATA72,168,40,40,40,42,42,20
1210 DATA68,170,42,40,40,40,40,16
1220 DATA64,162,34,34,42,42,42,21
1230 DATA66,162,36,24,24,36,37,66
1240 DATA64,68,42,16,16,32,160,64
1250 DATA36,88,8,16,16,32,74,116
```

```
10 PRINT"□PLEASE WAIT"
20 POKE51,255:POKE52,27:POKE55,
255:POKE56,27
30 FORI=0TO511
40 POKE7168+I,PEEK(32768+I):NEXT
50 FORI=0TO(26*8-1):READA:T=T+A
60 POKE7168+I+(1+8),H:NEXT
65 IFT<>8740THEN"DATA ERROR
     - PLEASE   CHECK":STOP
70 PRINT"□":POKE36869,255
1000 DATA24,24,36,60,102,66,66,0
1010 DATA124,34,34,60,34,34,124,0
1020 DATA126,34,34,32,32,32,112,0
1030 DATA24,24,36,36,102,66,126,0
1040 DATA126,34,32,56,32,34,126,0
1050 DATA126,70,12,24,48,98,126,0
1060 DATA102,36,36,60,36,36,102,0
1070 DATA24,36,66,126,66,36,24,0
1080 DATA28,8,8,8,8,8,28,0
1090 DATA102,36,40,48,40,36,102,0
1100 DATA24,24,60,36,36,102,102,0
1110 DATA66,102,90,66,66,66,66,0
1120 DATA66,98,82,74,70,66,66,0
1130 DATA126,0,36,60,36,0,126,0
1140 DATA24,36,66,66,66,36,24,0
1150 DATA126,36,36,36,36,36,36,0
1160 DATA124,34,34,60,32,32,112,0
1170 DATA126,98,48,24,48,98,126,0
1180 DATA62,42,8,8,8,8,28,0
1190 DATA20,42,8,8,8,8,28,0
1200 DATA8,28,42,42,28,8,8,0
1210 DATA102,66,36,24,36,66,102,0
1220 DATA42,42,42,28,8,8,28,0
1230 DATA0,24,36,66,66,36,102,0
1240 DATA0,0,0,0,0,0,0,0
1250 DATA0,0,0,0,0,0,0,0
```

Brackets

by M C Hart

'Brackets' is a vital program for anyone submitting Comodore 64 programs to *APC*.

One of the main problems in reproducing Commodore programs' listings is that cursor control and colour codes are often all but illegible. Brackets converts these characters into meaningful names in square brackets (see line 300 of the listing).

It would be greatly appreciated if all Commodore 64 listings accompanying *APC* Programs submissions are produced using this program. Simply run Brackets, then SYS toggles the feature on/off.

Brackets also provides a useful pause facility during listings: hold down the SHIFT key (or engage SHIFT-LOCK) to pause a listing.

```
  1 DATA173,7,3,73,223,141,7,3,173,6,3,73,11,141,6,3,96,72,173,141,02,208,251,104
 2 DATA 8,133,255,152,72,36,15,48,8
 3 DATA104,168,165,255,40,76,26,167,162,0,232,189,-188,240,240,197,255,208,246,16
 0
 4 DATA0,200,185,-156,201,91,208,248,202,208,245,32,210,255,200,185,-156,201,93
 5 DATA208,245,32,210,255,104,168,165,255,40,76,246,166,144,5,28,159,156,30,31,15
 8
 6 DATA18,146,147,19,148,20,145,17,157,29,160,255,133,137,134,138,135,139,136,140
 7 DATA0,0,0,0,91,66,76,65,67,75,93,91,87,72,73,84,69,93,91,82,69,68,93,91,67,69,
 65
 8 DATA78,93,91,80,85,82,80,76,69,93,91,71,82,69,69,78,93,91,66,76,85,69,93,91,69
 9 DATA69,76,76,79,87,93,91,82,86,83,93,91,82,86,83,79,70,70,93,91,67,76,82,53,91
 10 DATA72,79,77,69,93,91,73,70,83,93,91,68,69,76,93,91,85,80,93,91,68,79,87,70,9
 3
 11 DATA91,76,69,70,84,93,91,82,73,71,72,84,93,91,83,72,45,83,80,67
 12 DATA93,91,80,73,93,91,70,49,93,91,70,50,93,91,70,51,93,91,70,52,93,91,70,53,9
 3
 13 DATA91,70,54,93,91,70,55,93,91,70,56,93
 100 T=PEEK(55)+256*PEEK(56)
 110 L=T-275
 120 FORJ=LTOT-1:READ X%
 130 IFX%<0 THEN Y=X%+T:X%=Y/256:Z=Y-X%*256:POKEJ,Z:J=J+1
 140 POKEJ,X%:NEXT
 162 H%=(L+17)/256
 164 P=(H% OR 167) AND NOT (H% AND 167)
 166 POKEL+4,P
 172 L%=(L+17)-256*H%
 174 P=(L% OR 26) AND NOT (L% AND 26)
 176 POKE L+12,P
 200 POKE 55,L-INT(L/256)*256:POKE56,L/256
 210 SYSL
 300 PRINT"[CLR][DOWN]SYS"L
 310 PRINT"TURNS OFF THE SPECIAL "
 320 PRINT"'LIST' FUNCTION NOW"
 330 PRINT"LOADED IN MEMORY AND"
 340 PRINT" TURNS IT ON LATER"
 READY.
```

Spectrum File

by Damhaut Marc

APC program referees are normally a calm bunch and it's rare to find a program that has them dancing round the keyboard. This is such a program and is, in our referee's own words 'Brilliant'.

'Spectrum File is a very well-written general purpose database; fast and easily adaptable with good use of the Spectrum's capabilities.'

Spectrum File instruction

Spectrum File handles files on a 48k Spectrum. With it you can create, search, fill, change, print and copy forms. The file can be up to 31k in size but only the used part is saved to tape. The program is menu-driven and an explanation of each of the 10 options follows.

1 Design file

Your first task is to define your file

```
  10 DEF FN a()=PEEK 23627+256*PEEK 23628
  20 DEF FN e()=PEEK 23641+256*PEEK 23642
  30 POKE 23675,81: POKE 23676,255
  40 RESTORE
  50 DATA 255,129,129,129,129,129,129,255
  60 FOR i=USR "u" TO USR "u"+7: READ a: POKE i,a: NEXT i
 100 BORDER 0: PAPER 0: INK 7: BRIGHT 0: OVER 0: FLASH 0: CLEAR 65520
 105 LET di=0: LET help=130: LET l$="--------------------------------": LET s=0:
LET fi=0: LET fc=0: POKE 23609,255: POKE 23562,1
 110 PRINT AT 5,4;"SPECTRUM FILE";AT 6,4;"_____________";AT 15,13; 1983 DAMHAU
T Marc"
 120 GO SUB 900
 130 CLS
 140 PRINT AT 5,11;"MAIN MENU";AT 6,11;"_________"
 150 PRINT : PRINT "|0| CHANGE DESIGN   |5| REMOVE"'"|1| DESIGN FILE     |6| SAV
E"'"|2| ADD              |7| PRINT"'"|3| SEARCH/UPDATE   |8| LOAD"'"|4| SORT OUT
      |9| END"
 160 INPUT "Select function : ";a: POKE 23658,0
 170 IF a<0 OR a>9 THEN  GO TO 160
 180 IF (a=0 OR a>1 AND a<8) AND NOT fi THEN  PRINT AT 20,10; FLASH 1;"  NO FILE
  ": GO TO 160
 185 IF (a=1 OR a=8) AND fi THEN  PRINT AT 18,0;"The present file will be killed
.": GO SUB 800: IF re THEN  PRINT AT 18,0,,,,,,,,,: GO TO 160
 190 BRIGHT 1: INK 0: CLS : BRIGHT 0: INK 7: IF a THEN  GO TO INT a*1000
 195 GO TO 7500
 200 REM print format
 205 FOR i=1 TO di: PRINT  BRIGHT 1; PAPER 0; INK 7;AT a(1,i),a(2,i);m$(a(3,i) T
O a(4,i));"i";
 210 DIM g$(a(7,i)): PRINT  PAPER 1;g$;: NEXT i
 220 RETURN
 299 REM ENTER
```

which may contain as many forms as you want, each made up of as many items as you want. Select 1 on the main menu and design your file. Each item contains three parts: its name followed by a colon, and points which will be replaced by letters during the filling-in. For example,

NAME:.....
FIRST NAME:.....
CITY:.....
STREET:..... NUMBER:.....
JOB:.....

Use cursor keys to move around on the screen — CAPS LOCK, DELETE keys work. As the computer scans the screen from top to bottom, you can speed up its search by entering a space followed by ' ' after your last item. Items must be separated by one or more spaces. Apart from this, items may be anywhere on the screen. Press ENTER when this operation is finished. If you have made an error, the cursor will move to your 'mistake'.

REM: You must put enough points in an item to contain your information, plus a character for the retrieve specifications (see 'Search').

After the scanning period (which can last up to a minute according to your file), the computer shows you the maximum number of forms you will be allowed to use. Then press ENTER to return to the menu.

2 Add

Once you have created a file, you can store your information in it. With the add function, you fill in the blank form with the information you want to keep then add that filled-in form to the file.

Select 2 on the main menu. A blank form should appear, the points being replaced by a blue background.

The 'ready' button at the bottom of the screen says you can enter a form (press ENTER or a letter) or return to the menu (press SPACE or STOP).

You can only write on the blue background (use cursor keys DELETE, CAPS LOCK). EDIT cancels all instructions.

You can go to item number n by pressing both SHIFT keys followed by n.

Q means + 10
W means + 20

For example, to go to item number

3	Press CAPS SHIFT SYMBOL SHIFT	3
9		9
15		Q5
27		W7
20		W0

Press ENTER to enter this form.

You will be able to come back to this

```
 300 LET ntp=0: PAPER 8: INK 7: BRIGHT 8: IF a=1 THEN  LET x=0: LET y=x: GO TO 3
20
 310 LET y=a(5,1): LET x=a(6,1)
 320 PRINT AT y,x; OVER 1;"p"
 325 LET ax=x: LET ay=y
 330 LET a$=INKEY$: IF NOT LEN a$ OR CODE a$>127 THEN  GO TO 330
 339 IF a$>CHR$ 7 AND a$<CHR$ 12 THEN  LET x=x+((a$=CHR$ 9) AND x<32)-((a$=CHR$
8) AND x): LET y=y+((a$=CHR$ 10) AND y<21)-((a$=CHR$ 11) AND y): GO TO 410
 340 IF a$=CHR$ 7 AND a<>1 THEN  PRINT AT y,x;" ": GO SUB 200: GO TO 310
 344 IF a$=CHR$ 14 THEN  GO TO 1000
 345 IF a$=CHR$ 6 THEN  POKE 23658,8*(NOT PEEK 23658): GO TO 300
 350 IF a$=CHR$ 13 THEN  PRINT AT y,x; OVER 1;"p": RETURN
 355 IF ATTR (y,x)>63 THEN  PRINT AT y,x; OVER 1;"p": LET x=x+1: GO TO 365
 360 IF a$=CHR$ 12 THEN  LET x=x-((x>0) AND ATTR (y,x-(x>0))<63): PRINT AT y,x;"
";CHR$ 8;"p" AND x=ax: GO TO 410
 362 BEEP .005,13: PRINT AT y,x;a$: LET x=x+1
 365 IF x=32 THEN  LET x=0: LET y=y+(y<21)
 370 PRINT AT y,x; OVER 1;"p"
 380 IF NOT LEN INKEY$ OR PEEK 23558<2 THEN  GO TO 325
 390 GO TO 380
 410 PRINT AT ay,ax; OVER 1;"p": GO TO 365
 499 REM print
 500 LET p=1
 510 FOR i=1 TO di: PRINT  PAPER 8;AT a(5,i),a(6,i);f$(w,p TO p+a(7,i)-1): LET p
=p+a(7,i): NEXT i
 520 RETURN
 599 REM search-set up z$
 610 GO SUB 200: GO SUB 300
 620 LET p=0: LET z$="1": FOR i=1 TO di: LET l=a(5,i): LET c=a(6,i)-1: LET ap=p:
 LET p=p+a(7,i)
 625 DIM w$(a(7,i)): GO SUB 1900: IF a$=" " THEN  GO TO 710
 627 LET w$(1)=a$
 630 FOR j=2 TO a(7,i): GO SUB 1900: LET w$(j)=a$: NEXT j
 640 IF w$(1)=" " THEN  GO TO 710
 650 LET z$=z$+" AND f$(w,"+STR$ (ap+1)+(" TO "+STR$ p) AND ap+1<>p)+")"
 660 IF w$(1)=">" THEN  LET z$=z$+">": LET w$=w$(2 TO ): GO TO 700
 670 IF w$(1)="<" THEN  LET z$=z$+"<": LET w$=w$(2 TO ): GO TO 700
 680 IF w$(1)="#" THEN  LET z$=z$+"<>": LET w$=w$(2 TO ): GO TO 700
 690 LET z$=z$+"="
 700 LET z$=z$+""""+w$+""""
 710 NEXT i: IF LEN z$>1 THEN  LET z$=z$(3 TO )
 720 RETURN
 800 REM  RETURN
 810 PRINT '"Press R to return to menu"'"or ENTER to continue.": PAUSE 0: LET re
=(INKEY$="r")+(INKEY$="R"): RETURN
 899 REM WAIT
 900 PRINT AT 21,0;"Press any key to continue."
 910 PAUSE 0
 920 RETURN
1000 CLS : LET fi=0: LET s=1: PRINT #1;AT 0,0;1$'"DESIGN FILE"
1010 GO SUB 300
1130 LET f1=0: LET le=1: LET ch=0: LET di=0: LET fc=0
1140 FOR l=0 TO 21: FOR c=0 TO 31
1150 LET a$=SCREEN$ (l,c): IF a$="^" THEN  GO TO 1240
1160 LET p=(a$=" ")+(a$=":")*2+(a$=".")*3: LET f1=f1*(a$<>":")
1190 IF NOT p THEN  LET p=4: LET f1=1
1200 IF (p=4 AND ch=3) OR (p=1 AND ch=2) OR (p=3 AND (ch=1 OR ch=4)) OR (p=2 AND
 (ch=2 OR ch=3)) THEN  GO TO 1990
1220 IF p=2 THEN  LET di=di+1
1225 IF f1 THEN  LET le=le+1
1230 LET ch=p: NEXT c: NEXT l: LET c=c-1: LET l=l-1
1240 IF p=2 OR p=4 OR f1 THEN  GO TO 1990
1250 IF NOT di THEN  LET fi=0: GO TO 130
1260 DIM m$(le): DIM a(8,di): LET pi=1: LET p=0: LET l=0: LET c=-1: LET e=0
1270 GO SUB 1900: IF e THEN  GO TO 1400
1280 IF a$=" " THEN  GO TO 1270
1290 LET p=p+1: LET a(1,pi)=l: LET a(2,pi)=c: LET a(3,pi)=p: LET m$(p)=a$
1300 GO SUB 1900: IF e THEN  GO TO 1400
1310 IF a$<>":" THEN  LET p=p+1: LET m$(p)=a$: GO TO 1300
1320 LET a(4,pi)=p: LET a(5,pi)=l: LET a(6,pi)=c+1: LET ndp=0
1330 GO SUB 1900: IF e THEN  GO TO 1400
1340 IF a$<>" " THEN  LET ntp=ntp+1: LET ndp=ndp+1: GO TO 1330
1350 LET a(7,pi)=ndp: LET a(8,pi)=ntp: LET pi=pi+1
1360 GO TO 1270
1400 CLS : LET nf=INT ((30000-di*50)/ntp): PRINT AT 5,0;"Maximum number of forms
:";nf
1410 DIM f$(nf,ntp): LET fi=1
1420 GO SUB 900: GO TO 130
1800 LET t=0: PRINT AT y,x; OVER 1;"p"
1810 IF NOT di THEN  GO TO 300
1820 LET a$=INKEY$: IF a$="q" THEN  LET t=10*(di>=10): GO TO 1820
1825 IF a$="w" THEN  LET t=20*(di>=20): GO TO 1820
1830 IF CODE a$<49-t/10 OR CODE a$>48+di-t THEN  GO TO 1820
1840 LET x=a(6,VAL a$+t): LET y=a(5,VAL a$+t)
1850 IF INKEY$="" THEN  GO TO 320
1860 GO TO 1850
1900 LET c=c+1: IF c=32 THEN  LET c=0: LET l=l+1: IF l=22 THEN  LET e=1: RETURN
1910 LET a$=SCREEN$ (l,c): IF a$="^" THEN  LET e=1
1920 RETURN
1990 LET x=c: LET y=l: BEEP .2,0: GO SUB 320: GO TO 1100
2000 PRINT #1;AT 0,0;1$'"ADD"
2010 GO SUB 200: PRINT #1;AT 1,27;"Ready"
2020 IF NOT LEN INKEY$ THEN  GO TO 2020
2030 IF INKEY$=" STOP " OR INKEY$=" " THEN  GO TO 130
2040 PRINT #1;AT 1,27,: IF fc>=nf THEN  CLS : PRINT  FLASH 1;" FILE COMPLETE ":
BEEP 1,0: GO TO 140
2050 LET s=1: LET fc=fc+1: PRINT #1;AT 1,4;"FORM ";fc;"/";nf;AT 1,22;INT ((fc-1)
/nf*100);"%"
2060 GO SUB 300
2070 GO SUB 2150
2080 GO TO 2010
2150 LET p=1: FOR i=1 TO di: LET l=a(5,i): LET c=a(6,i)-1
2160 FOR j=1 TO a(7,i): GO SUB 1900: LET f$(fc,p)=a$: LET p=p+1
2170 NEXT j: NEXT i
2180 RETURN
3000 PRINT #1;AT 0,0;1$'"SEARCH/UPDATE"
```

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MR. J. STERN, Herts

"I have at last received your 'Hobbit' program and would like to congratulate you on its excellence. After four days of sweat and tears I have completed only 37.5 per cent of the adventure. The program has lived up completely to expectations, and there is no doubt about it being the best production for the Spectrum to date. You have surpassed all others with this program."

"A lot of fun."

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"The excellent gra
The exciting differ
is that it is possibl
converse with all t
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recommend this g
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'Hobbit'. I think it is one of
ingenious programs I have h
to use. It has kept me stum
months. I think the effort th
writing a program like this must have be
enormous. The effects are brilliant to say t
least."

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e excellent graphics. We
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misty Mountains
, this game is
reat to play and is No. 1 for
nd excitement."

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COMPUTER WEEKLY

"Within my circle of friends this game has become something of an obsession. We meet every Friday night at someone's house and spend 3-4 hours on 'The Hobbit'. Friday night would not be the same without 'The Hobbit'."

CHRISTINE VERCHILD, Wilts

"One new Adventure game stands head and shoulders above the rest. It alone almost provides you with a good enough reason to buy a 48K Sinclair Spectrum. Not only does The Hobbit produce drawings of the main scenes, but it also understands proper sentences rather than pairs of words for its commands. It comes with a copy of J.R.R. Tolkien's classic book of the same name. It is the program with the most detailed and best written documentation ever."

WHAT MICRO

"This is an impressively packaged Adventure game which makes good use of the Spectrum's colour graphics. They have not only produced one of the best games for the Spectrum, but given everyone else a lesson in good game design."

PRACTICAL COM

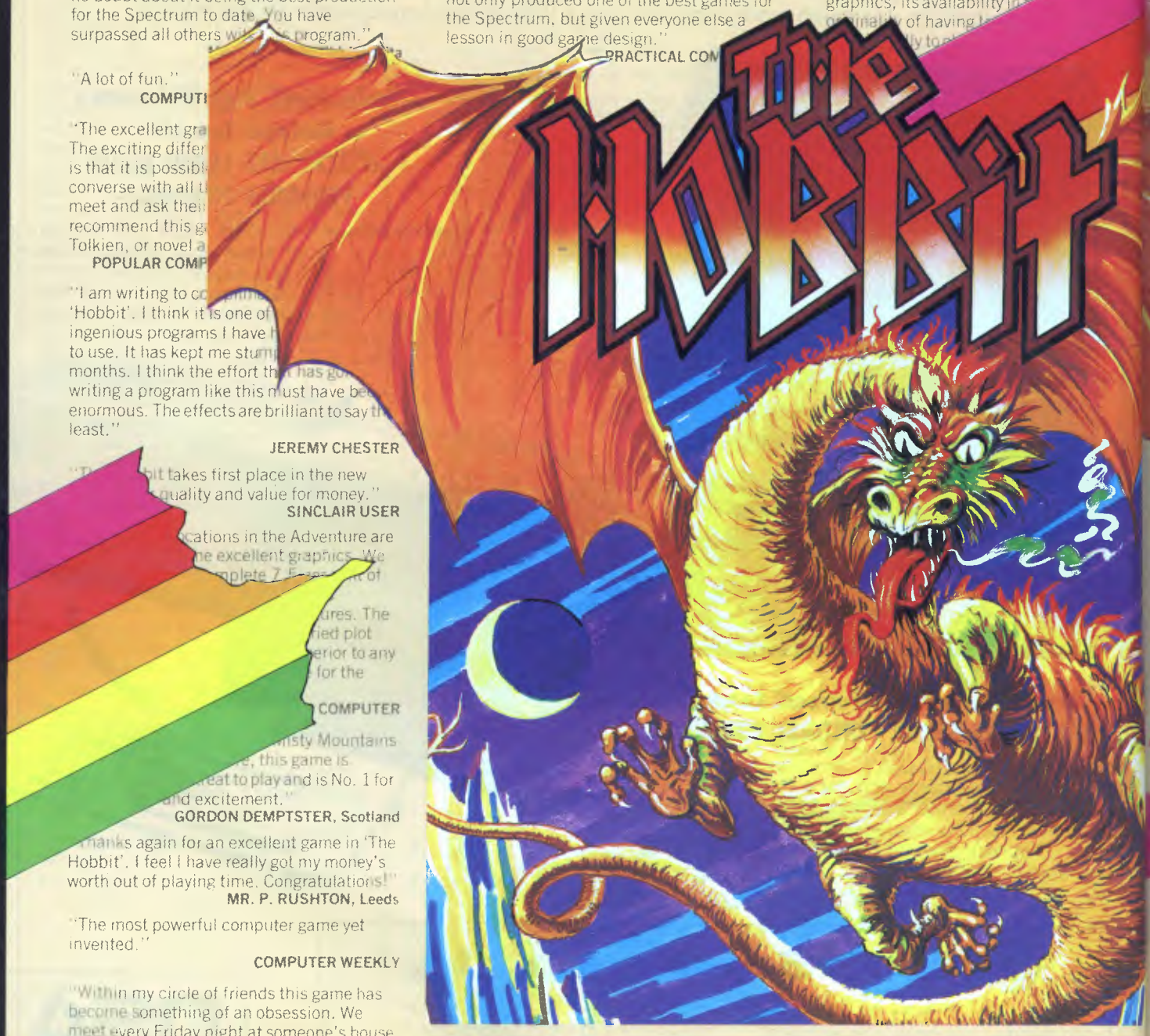
"I am the owner of a copy of 'The Hobbit' which is wonderful entertainment, and ver challenging. I have other tapes and publications of yours, all of which are excellent."

MR. D.J. BURGH, Ke

"Having received the most excellent piece o programming I have ever seen, we have ha no social life whatsoever. 'The Hobbit' has been dominating our lives since January an many nights have been spent until 3 o'cloc trying to conquer it."

SIMON ROGERS, A

"I have recently purchased your excellent adventure game 'The Hobbit'. This greatly enhanced by the use of graphics, its availability in originality of having ly to



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...ulate you on a ... have enjoyed ...mensely. I must thank you ...oducing such a clever product, it was worth every penny of the purchase price."
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...d for my ZX ... you supply called ... excellent ...the money. I find ...ery realistic. The ...accurate. It sticks ...e book, which is a ...it very compelling ...ctive."
...VEN CASSIDY, Essex

...ing recently purchased a Sinclair ...trum I decided to buy 'The Hobbit' ... I have been doing a literature project ...sed on 'The Hobbit' with my class of 10 ...d 11 year old children. Over the last 10 ...eeks the children, having read the book, ...ve been attempting the program with my ...ssistance. Let me congratulate you on a ...ost entertaining program."
MR. K. REID AND CLASS 7, Nottingham

"... more of an experience than a program."
POPULAR COMPUTING WEEKLY

"... the most unique factor in this program ... that the user instructs the computer in ... completely original English sentences. The ... Hobbit program is capable of understanding ... and correctly carrying out ..."
ZX COMPUTING

"... purchased 'The Hobbit' not long ago and ... one when I had finished ... game, and I found myself ... wants to talk to me about is my ... adventures in 'The Hobbit'."
...D ROWLEY, Stoke-on-Trent

"The use of graphics is one of the features which makes 'The Hobbit' special. The addition of graphics as good as these adds a whole new dimension to the Adventure. It is certainly a marvellous game, which should set the standard for future Spectrum adventures."
ZX COMPUTING

GOLDEN JOYSTICK AWARD
BEST STRATEGY GAME

"'The Hobbit' is a beautifully constructed, frantically-maddening, tortuous, gloriously inconsistent, thoroughly spooky adventure — far better than I could have hoped for and certainly the finest of the dozen or so adventure programs I have. In short, I congratulate the four who sweated for a year and a half."
MR. PETER JONES, South Glam

"Nothing is certain in this Adventure, but uncertainty! Add to this the brilliant graphics that are used to describe many of the locations and we have an Adventure that is going to become a classic for the Spectrum."
POPULAR COMPUTING WEEKLY

"...we are not eating food...we are losing sleep...and it's great! We are lost, in the Hobbit program."
MR. JOHN HARRIS, Kuwait

"The children were immediately enthusiastic about the program (even dedicated footballers gave up some playtimes to use it!). Many children borrowed copies of 'The Hobbit' from the library to read for themselves."
JUNIOR EDUCATION MAGAZINE

"'The Hobbit' arrived and single-handedly set the standard for adventure games to come, with its sophisticated mixture of advanced language analysis and beautifully detailed graphics."
MICRO ADVENTURER

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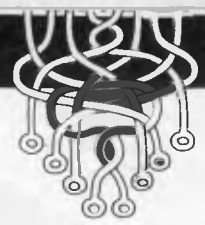
• Disk versions available at $32.95

APC8

LAZING AROUND



BY J J Clessa

Quickie

The area in square metres of a square patch in my garden is equal to three times its perimeter in metres.

What is the side of the square?

Prize Puzzle

This one shouldn't be too difficult.

256 is a perfect square whose digits are in ascending sequence (2,5,6): that is, each successive digit is greater than the one preceding it.

Can you find:

a) The largest perfect square with this property, and;

b) The largest perfect square with the converse property: that is, whose digits are in descending sequence.

The answer to (b) might surprise you. Incidentally, leading zeros are not counted.

Answers on postcards only to — Prize Puzzle September 1984, Lazing Around *APC*, 77 Glenhuntly Road, Elwood, Victoria 3184 no later than 25 September 1984.

June Prize Puzzle

An excellent response — about 120 entries in all — indicating just how easy the puzzle was.

A micro program was not really needed, but it offered a lazy way to find the answer, which was 7000 items @ 214.99 each giving 1,504,930 Australian Dollars.

The winning entry, chosen at random from the great heap, came from Mr Greg Jenkins of Carnarvon.

Congratulations Mr Jenkins, your prize is on its way.

Meanwhile, don't forget postcards (or backs of envelopes) only.

Keep Puzzling.

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